Public works.

MUNICIPAL JOURNAL AND ENGINEER

VOL. XVII NEW YORK, JULY, 1904 No. 1

PARKS FOR INDUSTRIAL CITIES*

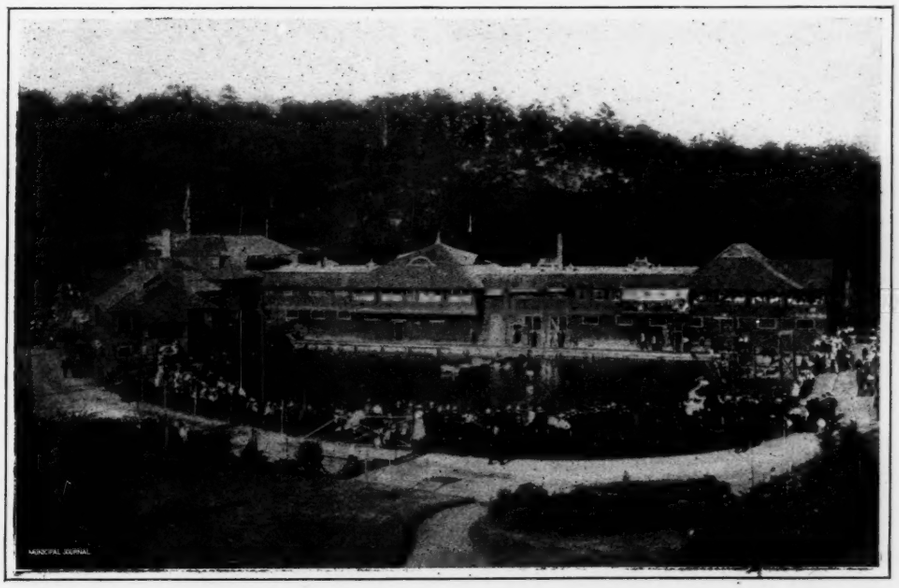
American Parks Lack the Features Essential to the Welfare of the Greatest Number—The Defects Pointed Out—Valuable Suggestions for City Officials

By Stephen Child

IN a recent number of this magazine the writer called attention briefly to a few of the many ways of increasing the usefulness of parks already built in our large cities, and it was there shown that not only do we need to stimulate the people of our well parked cities to a more complete use of these advantages, but also that there should be a closer adaptation of the park areas to the population's needs. Let us now turn, for a few moments, to a consideration of some of the needs which should be borne in mind in the design of park systems for that class of cities in this country, now but poorly supplied with such advantages; namely, industrial cities.

POINTS TO BE CONSIDERED IN SELECTING A PARK SITE

Much has been written about the importance of selecting the areas to be developed for parks with reference to their topography and the restful beauties of their landscape features. This is indeed a very vital consideration in the design of a park system, but there is another perhaps equally important one, and that is the social conditions that prevail among the different elements of the population of any given city. Each city will have peculiarities that differentiate it from all others. Many of our cities have very complex populations, and such communities should have correspondingly varied forms of parks. These two principles, the topographical and the social, must, if the problem is to be satisfactorily solved, be kept constantly in mind. We must also remember that once having solved the problem satisfactorily for one community, it does not by any means follow that the design can be duplicated in another, for in no other will the same topographical and social conditions exist. Each community must be studied and its park problems solved then independently of every other.



A SUGGESTION FOR A COMMUNITY PARK†

In order more clearly to understand some of the conditions involved in the solution of these problems, it may be well to try to classify our cities broadly. We shall find, I think, that for our purposes the size of the city or what it consumes, or how it does its work, has less to do with a proper classification than what the city does for others. With this thought in mind we shall see that cities divide themselves into four or five great classes:

First, and perhaps most important, are industrial cities;

* This is the last in a series of three articles, each complete in itself, contributed by Mr. Stephen Child, Landscape Architect, of Boston.—[EDITOR.

† A Swimming Pool with Locker and Gymnasium Building provided with an Assembly Hall suitable for various entertainments: The Recreation Grounds at Riverside, Mass.

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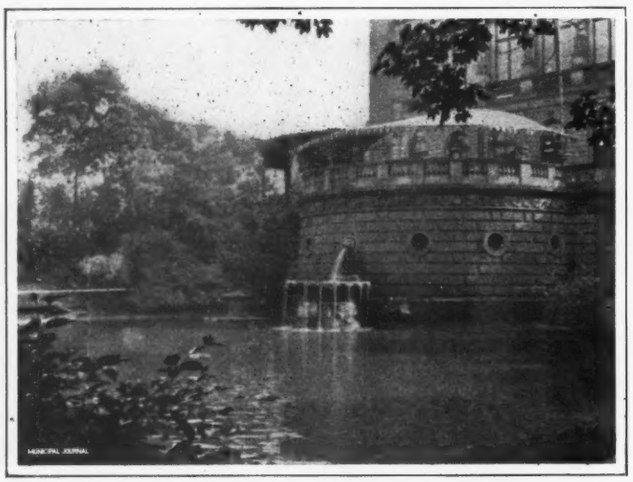
that is, those that manufacture more than they consume and send their surplus to supply the needs of other cities.

Second, commercial cities, or those that receive more than they need for their own use and distribute it to other



OPEN-AIR CAFÉ *

cities without making any material change in its condition.

Third, financial cities; that is, those to which more money gravitates than is needed for local purposes, money which is loaned again to other localities.

Fourth, capital cities, where the functions of government, the legislative, judicial and executive powers, are centered.

We may also have educational cities, as, for example, Cambridge, Mass., or Ithaca, N. Y., where great educational institutions dominate the community, and, of course, we have in our largest or composite cities, such as New York, Philadelphia and Chicago, combinations of many of these.

ALL CITIES CANNOT SOLVE PARK PROBLEM IN SAME WAY

The needs of these various classes of cities as regards park developments must be studied intelligently by the landscape architect and by the park commissioners of each. Such bodies of men should be non-partisan and selected from the best elements, and by this I do not mean to imply the best educated necessarily, or the wealthiest. I believe that, at least, one thoughtful, broad-minded representative of labor in each city should be included in the park commission membership.

The needs of commercial, financial and capital cities so far as park work is concerned have been very carefully studied and are comparatively well understood, and more or less fully provided for, but there are some special facts to be considered in connection with that class of communities which we have defined as industrial cities. It is well to remember that such cities are very new in the world's history, while commercial, governmental and financial cities have been in existence for thousands of years, for it was not till the nineteenth century, and hardly till the latter half of that century, that, owing to the rapid development of mechanical processes and the growth and development of factories, industrial cities had any reason for being.

Statistics are proverbially dry reading, but a few figures will show these facts very strikingly, for the census reports show that one hundred years ago 97 per cent. of the population of this country was rural, only 3 per cent. all told living in cities, while the last census shows that in spite of the fact that our total population has now increased to twenty times what it was then, only 60 per cent. of this great total lives in rural communities; the balance, 40 per cent., or something over 30,000,000 people, live in cities. It is also a noticeable fact that of the seventy-eight cities in this country that have a population of over 50,000 at least thirty might be classed as industrial cities, well-known types of which are presented in Elizabeth, N. J.; Fall River and Lowell, Mass., or Scranton, Pa. A careful study of the 135 cities in this country having a population of 30,000 or over, with a view to determining how many have well developed park systems, brings out the fact that every one of these well-parked communities is a city in which the industrial interests are of minor importance. In other words, the park system for the industrial city is yet to be.

THE NEEDS OF THE COMMON LABORER SHOULD BE CONSIDERED

Now we all know that in commercial and composite cities there are thousands of workingmen each of whom has as much right to use the park system as any merchant or banker, but we also know that in spite of the fact that in some of these cities a very large proportion of the population are laboring people, not 10 per cent. of this laboring element use the parks. It would seem to be the fact, therefore, that the park systems of such cities do not satisfy their needs. It is pertinent to inquire why they do not, and it is the duty of every park official to endeavor, in every way

CHILDREN'S SWINGS—AN ATTRACTION FOR A COMMUNITY PARK

possible, to see to it that the wants of such people are gratified.

In order to understand why some of our park systems do not appeal to the laboring element more, it will be well to consider briefly the mode of life in some of our large industrial cities, for example, a typical New England cotton mill city, like Lawrence or Lowell. The life of the thousands of operators here is one of very great monotony. Day

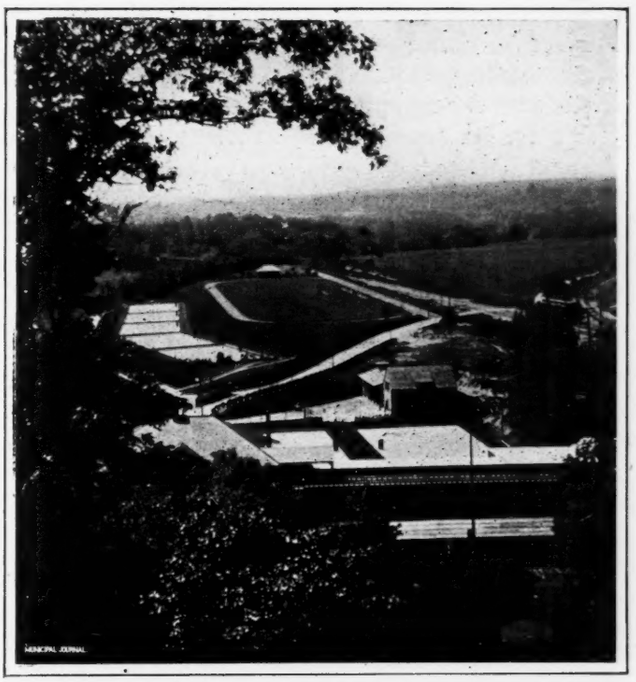
* Rear of New Theatre, Leipzig, Saxony, illustrating features that might be introduced in a Community Park.

after day they walk over the same streets at the same hours, do the same work, operate the same machines, and, as a rule, reach their homes too exhausted to do more than the necessary home duties. Certainly they are too tired to go four or five miles to a large park, even if they felt that they could afford the expense of the car-fare. There is every reason to believe that such a monotonous existence persisted in for ten or fifteen years will bring on some form of atrophy, perhaps not of any of the muscles of the body, but certainly of some of the varied faculties of the brain. Such people lose the power of using their minds to anywhere near their full capacity, and it really becomes in time impossible for them to understand large problems or to intelligently discuss new questions. Under such conditions they become the prey of labor leaders and organizers, and submit to orders and decrees of labor unions that they would never dream of doing if their minds were more active. It is for such people, living such lives, that some of our park systems have no attractions; they need something more interesting, something more stimulating. These very people are a large factor in our population, and their wants, especially in industrial cities, must be supplied, and the best thought of our intelligent park commissioners and landscape architects should be directed toward an effort to solve the problem of their needs, for a correct solution will do much to help relieve the strain of the numerous labor troubles now confronting us.

The System Best Adapted to the Industrial City

What then should be the ideal park system for an industrial city? Obviously only the most general statements can be made, and generalities are proverbially misleading, but from them we may get useful guides as to the special needs of each community. The most essential feature of a system of parks for such a city should be a number of small parks of from three to ten acres, situated near the homes of the workingmen, and these should be open day and evening every day in the year. Here should be play-grounds and an abundance of shade trees, and as much grass as can be made to grow successfully. To these parks, located as suggested near the workingmen's homes, it would be possible for his wife and children to go in the afternoon of the spring, summer and fall months. Here there should be plenty of sunshine, numerous seats and tables, and at night electric lights. Here he should be encouraged to join his family after his day's labor, all taking their evening meal together. As an aid to this result there should be a properly designed lavoratory-building, and arrangements also for serving hot or cold tea and coffee and milk at cost. Many charitable organizations might do good work here, rivaling that done in the soup-kitchens in some cities. There should be plenty of bright colored but simple flowers, outdoor and indoor gymnasiums should be provided with locker rooms and other necessary appurtenances for athletic contests of all sorts. Here might also be located public baths and swimming tanks, especially if a river or lake shore is available. There should be a band-stand, and concerts should be given at frequent intervals. Liberal provision should be made for shelter in case of rain, and for light and heat in the winter evenings, and by the cooperation of the proper officials with the bright young people of these communities, theatricals, parties, debating-clubs and lecture courses should be arranged. Reading-rooms could here be maintained. A large part of the work of these various entertainments should be done by the people themselves, and would be, if there were only suitable places provided in which to hold such meetings and entertainments. In some such ways as are here outlined a real community of interest may be maintained, the far-reaching benefits of which would react to the uplifting of the standards of morality, of helpfulness and of character in such cities.

Many of these ideas are applicable to the industrial portions of our great composite cities, and here is a very promising field for our wealthy philanthropists to enter. I believe that such a community park as is here outlined would do as much good in an industrial city as a public library. In fact, the public library might well be located in, or near, such a park, or at least a branch library. Such community park would be a most suitable location for a building such as the Social Halls Association of New York City plan to erect in various parts of the great metropolis. This association has already built one such social center in crowded Clinton street, New York, where it is doing a splendid work. How much better it might be if it could be located in some such a community park as is here outlined.



RECREATION GROUNDS AT RIVERSIDE, MASS., SHOWING BOAT HOUSES, TENNIS COURTS, RUNNING TRACK AND BALL FIELDS

After securing and developing one or more of these community parks in such cities, the larger country park might be developed. It might be that land for such a park could be economically acquired in advance, and the real development of its landscape features delayed until funds were available and needs greater. These large rural or naturalistic parks are of inestimable value, and they are needed in the industrial community as much if not more than in any other, but their features might well be differently arranged

here, and certainly transportation facilities should be cheap and adequate. Neatness and order should everywhere be insisted upon and maintained. Parkways connecting the smaller community parks with the larger and more rural park should be built, and these should have turfed, tree-shaded reserve space for electric cars. A bicycle path might well be provided, as well as the drive, and there should also be plenty of seats along the tree-shaded walks.

It is not claimed that such a system of parks would solve all the social and labor problems of our industrial cities, but they would materially help. The mutterings and rumblings of these troubles now heard on many sides will not diminish without intelligent effort on the part of both sides to the controversy, and these park suggestions will, I believe, materially help to alleviate the friction and to close the widening breach between labor and capital.

THE PAVING PROBLEM IN GENERAL*

Street Paving Second Only in Annual Expenditure to Steam Railways—Some of the Perplexities of the Problem—Not Enough Paid for Maintenance

By John W. Alvord, C. E.

At the beginning of the century 24,000,000 of the population of the United States living in cities of 8,000 and over had invested approximately $850,000,000 in improving their streets with curbing, paving, grading, and sidewalks. Each year a further improvement of over $70,450,000 for such improvements and their care and renewal is made, and the amount is constantly increasing.

But one other class of engineering works exceeds this in magnitude, that of the steam railway system of the United States.

One would suppose that this vast output of human energy would be the occasion of the most critical investigation and scientific research, but it is safe to say that in no other branch of civil engineering is there expended so large an amount of money in so unsystematic a manner, and generally with such unsatisfactory results.

Pavements are primarily designed to accommodate travel, but scarcely any one in this country thinks of investigating the travel of a city systematically and thoroughly before proceeding to lay down pavements.

Pavements are financial investments, yet few officials undertake to compile data from which to compute their operating expense, length of life, or depreciation, before proceeding to raise the necessary capital.

Street pavements are by far the most expensive single improvement that the municipality undertakes, yet in hardly any of the cities of this country are there suitable laws, proper organization, or sufficient public spirit adequately to care for the investment after it is once made.

The improvement of streets is a legitimate method of adorning our cities, yet no one thinks of consulting recognized authorities on good taste in such matters, except in boulevards and parks.

Pavements have been a necessity of civilization since Rome was mistress of the world, but cities are still experimenting with the subject without general and well-defined policies. Community after community repeats the fundamental experiments, and copies without reflection or study what they see being done elsewhere.

The railways of the country know to a penny the cost in life service and the comparative utility of every bolt and scrap of iron that enters into their composition. They can tell you to several places of decimals the cost of moving a ton-mile of freight and the transportation of a passenger.

Some of the Perplexities of the Problem

The city officials in this country that can make more than a rough guess of these matters in connection with the enormously greater travel of cities can be counted on the fingers of one's two hands.

Several things tend to explain this anomaly.

1st. The administration of American cities changes every few years. Omitting for the moment all complaint as to the blighting effect of partisan politics, settled policies producing advancement in the art do not naturally result from such constant change of direction. Seldom do officers of the municipality have the ambition or opportunity to become thorough masters of the broader requirements of the problems with which they are confronted.

2d. In a Republican State the taxpayer is expected to have a deciding vote in the expenditure of the public moneys, especially those raised by local taxation. In the matters of water supply or sewerage, he feels his inexperience and is willing to be somewhat advised, but upon the subject of pavements, he has positive convictions of his own. In the smaller cities, the taxpayers interested nearly always decide upon the kind of pavement to be laid. In the larger cities their voice is still most potent; as a consequence, there is the entire taxpaying body to be educated, not only in the science of road-building, but the broader public policies of such improvements, rather than to leave the matter to a few trained and educated minds. As a result, advancement proceeds no faster than the education of the whole mass of taxpayers.

3d. Different kinds of street pavement rise or fall in public estimation with an undue amount of popular fluctuation. This is because there is no pavement that is perfect for all classes of conditions, and the pavement that comes the nearest to meeting one set of requirements will be the furthest away from another set of requirements. The public having selected a pavement, perhaps ill adapted to a particular environment and finding it there lacking in important par-

* This article, together with the ones on "The Ideally Paved City," "American and Foreign Cities," "The Available Paving Material," constitute a digest of a special report made by Mr. John W. Alvord, Consulting Engineer, Chicago, to a committee of nine appointed by the Commercial Club of Chicago to obtain a broader knowledge of the street paving and maintenance problem of that city. Mr. Alvord was deputized by this committee to investigate the subject and report with facts and conclusions calculated to solve the problem for Chicago. While no large city is as poorly paved as Chicago, and while none needs all the information collected by Mr. Alvord for the particular use of his city, yet much will be found to be of general value to city officials throughout the country and, therefore, large space is given to a copious digest of the report in this issue. It is all the more valuable to the average city official because it is not couched in technical language.—[Editor.

ticulars is apt to thoughtlessly, and perhaps pettishly, condemn it in toto when such a sweeping verdict is not warranted.

Even city officials in charge of such matters do not always investigate carefully enough the causes which make for failure, and allow personal impressions to take the place of carefully investigated facts.

4th. The engineering profession in this country, up to within a few years, have not generally interested themselves in the subject of street paving, because they have not been given very large opportunity to properly study the question. Finding the taxpayer a self-appointed, and sometimes exacting, expert, they have been obliged more or less to abandon the field, so far as its broader questions are concerned, to him and accept his dictum.

The specialist on street paving has been long recognized abroad as an important factor in municipal progress, and of recent years, he is beginning to appear in the United States. Seldom, however, does an average city call for his services, and almost never do municipalities appoint commissions of such men with ample funds to make an exhaustive study of the street-paving problem.

5th. A natural distrust for municipal authorities is the normal condition of mind of the American taxpayer.

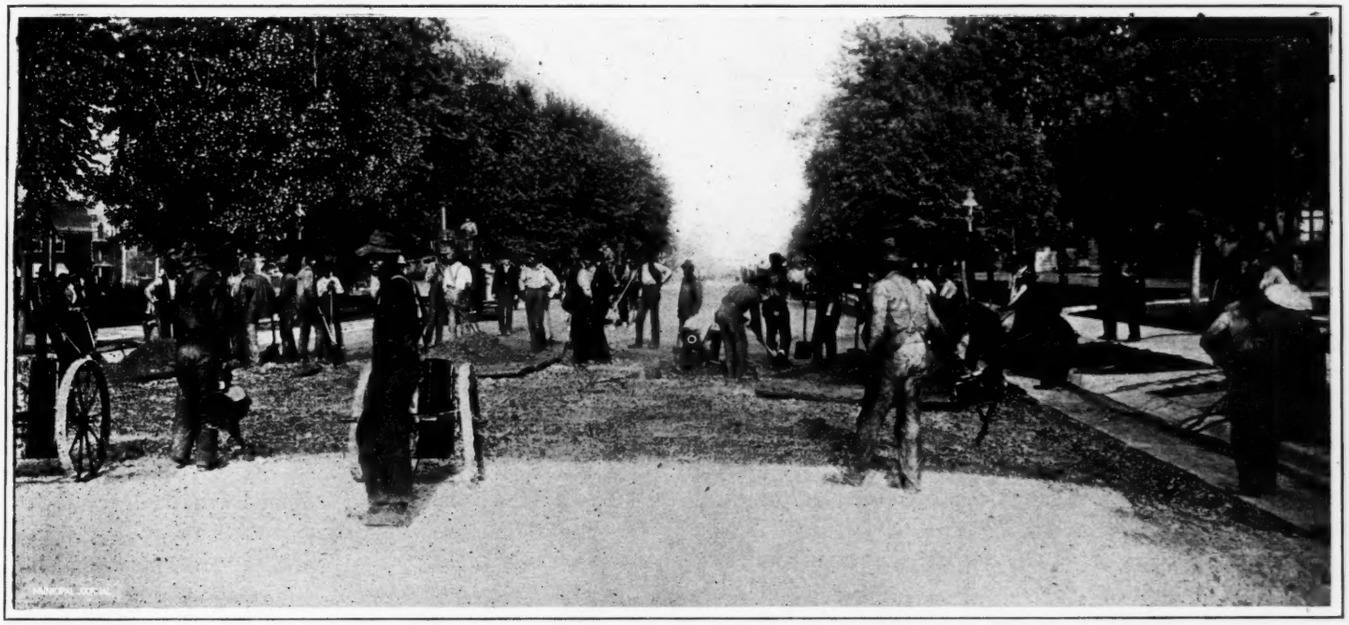
This is the inevitable result of a system that generally produces mediocre results. And nowhere are mediocre results more apparent and unhappy than in the work of street improvements.

As a result, the average city administration, however honest its intentions, feels that it is without moral support. It does not initiate broad policies, or spend public moneys, for investigation and research; it gropes its way in the darkness of chance, and plays its cards like an opportunist, postpones all possible trouble to its successors, blames all deficiencies onto its predecessors, while ever pleading for revenue for new experiments, and thus the waste continues.

A distrustful public generally refuses to co-operate in legislation tending to increase taxation for the future, until absolutely assured of wisdom and economy in the present. The public is at times a harsh judge, and does not easily overlook glaring imperfections or fully analyze deficient results.

6th. The usual method in this country of assessing the cost of improvements to the abutting property has tended to give undue prominence to the property owner, as the representative of the public in deciding upon and paying for street paving.

As a matter of fact, the abutting property owner is an agent. Whenever possible he passes on to the rest of the community, in the form of increased valuation and rental of his property, the cost he is assessed. Often he recoups himself for his outlay, many times over, yet ordinarily he regards himself as a public benefactor, and as such claims the right to outline street policies which usually lead down to his own pecuniary advantage rather than that of the public.



LAYING THE SURFACE OF BITULITHIC PAVEMENT ON LINDELL BOULEVARD, ST. LOUIS, MO.—THIS WORK IS DESCRIBED ELSEWHERE IN THIS NUMBER, UNDER THE CAPTION, "THE BITULITHIC PAVEMENT IN ST. LOUIS"

7th. The method of assessing the first cost of pavements on the property owner, and then maintaining the pavement out of the public fund, has resulted in the majority of cases in there being little if any maintenance at all. No municipality has ever had an adequate "general fund." The general fund is the common prey of all the more novel municipal projects and ambitions, and the commonplace uses to which it might be administered will always be unduly curtailed.

8th. There is no general public appreciation of the vital necessity of maintaining pavements after they are once laid, and as a consequence, there has been no co-operation on the part of the public in framing legislation and raising revenues which must be devoted strictly to this purpose.

In France, where road-building is a science, the practice

during the last twenty-five years has tended more and more to lessen the first cost of the national roads by decreasing the thickness of foundations and increasing the annual expenditure for maintenance. There are over $24,000,000 expended annually on 22,000 miles of national roads in France, equal to an average of $225.00 per mile per annum for repairs alone on country roads.

In this country, even in cities, the practice has been generally to build heavy improvements at high first cost, and allow them to wear out at a minimum of repair. The improved streets of Chicago had expended upon them for repairs, in 1902, the small average of only $41.75 per mile.

9th. And finally, the street-paving problem is everywhere regarded as a local neighborhood problem. Speaking broadly, the general public of this country has not yet come to regard it as a national problem, or even entirely a municipal problem, hence the lack of appreciation of the broader municipal requirements, and the insufficiency and lack of study of its fundamental principles. To this cause may be assigned the chaotic condition of the art and the incoherence of the data now existing, and the absence of any general principles which should govern the subject as a whole.

THE IDEALLY PAVED CITY

Principles of the Problem—Streets Must Be Classified According to Traffic—Adaptation of Kind of Pavement Must Be Studied

By John W. Alvord, C. E.

In order to be progressive on any subject we must first investigate ideal conditions, and then see how far they can be approximated from the practical side.

Let us first see what are the broad general principles which should underlie the street-paving problem, and how they must be applied to produce ideal results.

Principles of the Problem

1st. Street pavements are designed, constructed, and completed for practical purposes. And hence the first requirement for the municipal scheme for the city should be a thorough study of its traffic conditions—past, present and future—with detailed and exact surveys of its amount, tonnage, direction, and variation; not alone for the congested districts, but for the remote and unused streets. A census should be taken of all typical classes of streets, both in the business center, the unfrequented residence sections, and the outlying arteries of communication with the country. Such a census should be repeated at such frequent intervals, that all the facts connected with the city are thoroughly and exactly known, and can be compiled with the certainty that obtains at present in the population census, or vital and commercial statistics. Then it will be possible to find a basis for present policies and forecast the future necessities.

The French apportion their annual expenditure for maintaining the municipal and national roads in precisely this manner: For instance, on the national roads, once in six or seven years, a commission expends twelve months in ascertaining the exact amount of average travel, and their report is full of elaborate and carefully analyzed details. The 22,000 miles of national roads are divided into sections of from two to ten miles, each with its post of observation. There were 4,734 such posts of observation in 1894, and a record was kept for 24 hours every thirteen days during the year. Upon this data are apportioned, in proportion to the traffic, the $4,000,000 and over, which is used to maintain the magnificent highways which span France in every direction. The city of Paris pursues essentially the same plan, with some variations of detail. It is indeed difficult to see how any ideas can be formulated for the general improvement of the streets of cities without carefully compiled knowledge of this character from which to reason. Such information is a prime essential to the intelligent study of the street-paving problem of an ideal city.

2d. Having acquired a basic knowledge of the travel as above outlined, and carefully studied its tendencies and characteristics, it next becomes necessary to classify the streets in accordance with the requirements they have to meet. Something more than rough generalization in the mind of the head official of the department is desirable.

Legally defined classes, carefully described and adapted to different uses, should be adopted by the proper legislative authority. The streets after careful study should be placed in the different classes, in accordance with their needs and requirements, both as to the amount and character of traffic, width of roadway, depth of foundation, and amount necessary for maintenance and repair, should be adopted, and each class specified, so that, for instance, a choice may always be had for any given amount of traffic, as to whether the extreme of durability or minimum of noise is to be desired.

Classification of Streets Necessary

Class One. Congested Retail Business District. Team traffic of from 5,000 to 10,000 tons per day, largely lighter vehicles. Large pedestrian traffic at crossings. Desirable width of street, 100 to 120 feet. Broad roadways with width between curbs, 54 to 60 feet. Subways for all pipes and conduits of the public utility companies. Solid foundations for pavements. Highest type of noiseless and smooth pavement regardless of first cost or operating expenses, selected from point of view of comfort and convenience to public. Grooved street car rail. Refuge stands at center of streets at cross walks, such as are usual in Paris on the Champs Elysées. Low curbing; frequent public comfort stations; occasional subway crossings for pedestrians; brilliant lighting; annual maintenance for cleaning and repairs, based on amount of traffic, and liberal in amount.

Class Two. Streets of Heavy Tonnage in the vicinity of docks, warehouses, depots, etc., without large working populations adjacent. Heavy traffic loads, aggregating 5,000 to 15,000 tons per day. Width at least 80 to 100 feet. Broad roadways, with width between curbs 45 to 60 feet. Pave-

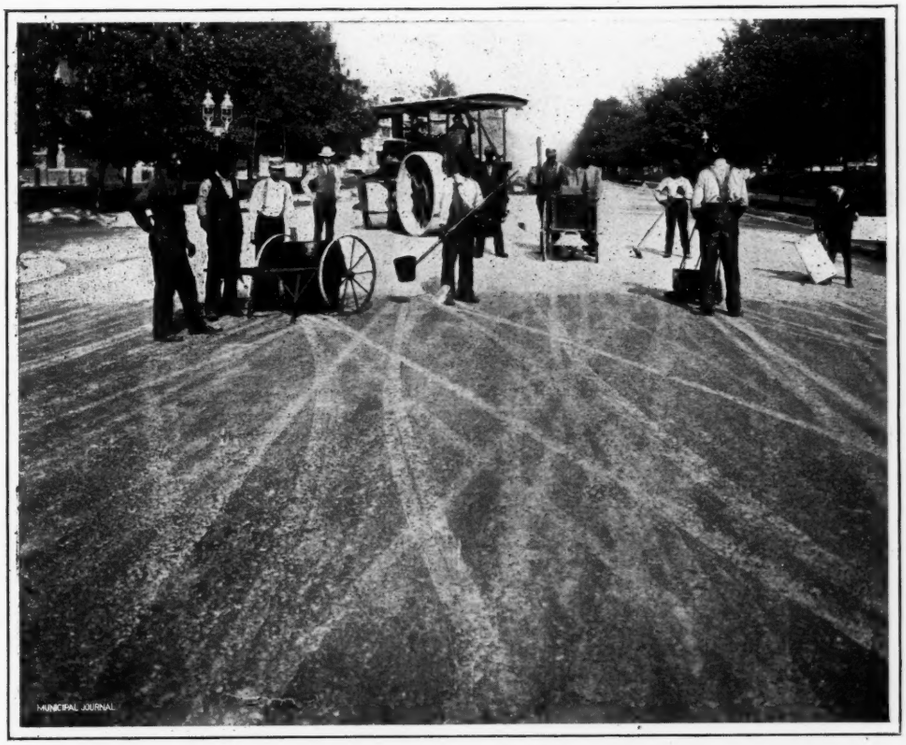
ments of the most enduring material, regardless of noise, on solid foundation, regardless of first cost. Refuge stands in center of streets at crossings. Fairly high curbings. Ordinary lighting.

Class Three. Second Grade Business Street, or a main artery of travel to country, carrying 1,000 to 5,000 tons per day of heavy loads. Wide roadways with width at least 50 feet between curbs. Medium depth of curb. Grooved street car rail. Subways for public utility companies. Durable pavements on solid foundations. Selection to be made with due regard to first cost and operating expenses.

Class Four. Fairly Well Traveled, High-Class Residence Streets. Traffic ten to fifty tons per day, largely light vehicles and delivery wagons. Fairly narrow roadways, width 26 to 34 feet between curbs. Ample grass plots, and proper tree planting. Pavements on solid foundation, smooth and noiseless. Selected with regard to cost of operation, comfort, cleanliness and noiselessness.

Class Five. Unfrequented Residence Streets. Traffic nothing to five tons per day. Very narrow roadway, width between curbs not more than 18 to 24 feet. Broad grass plots. Abundant tree planting.

Such a classification as the above, altered as may be found desirable or necessary after reasonable experience, ought to be the basis of every well-considered scheme of street improvement in cities.



SPREADING SCREENINGS—UNDER THE CAPTION, "THE BITULITHIC PAVEMENT IN ST. LOUIS," THE WORK ON LINDELL BOULEVARD IS FULLY DESCRIBED ELSEWHERE IN THIS NUMBER

Knowledge of Traffic, Traction and Life of Pavement Necessary

3d. With an exact census of travel should come much more complete knowledge of the life of different kinds of pavements under a given amount of wear. If it were known, for instance, that upon a certain street with a certain number of tons daily travel, and a given amount annually spent for repairs, that that kind of pavement lasted a certain number of years, a large amount of guess-work and personal impression would be eliminated from the street improvement problem, and we would know far more accurately how to select pavement for certain streets, so far as cost of operation was concerned; for knowing its life we could calculate its cost in terms of annual repair, plus sinking funds for renewals for any given condition. Our choice would then be narrowed down to the question of smoothness, noise, and other considerations of pure adaptability and comfort.

4th. It would be very desirable to know more about the tractive force which is required to draw loads over different classes of pavement. Some experiments have been made along this line, but they are not at all comparable to the magnitude of the interests involved, and are to a certain extent contradictory and inconclusive, owing to their limited number and range.

Most of the large railroad companies of the United States have found it desirable and necessary to make careful tests with dynamometer cars to determine the tractive force required on every part of their road, and it has been found desirable from a financial point of view, as a result of these experiments, to expend many millions of dollars in easing curves and reducing grades, to lower cost of operation.

The street traffic of our large cities is quite an analogous problem. What we desire to know is not only the tractive force required on each different kind of pavement, but on the same kind of pavement under different conditions of temperature, dryness, or cleanliness. Also we ought to know how long the tractive force is necessarily increased by the reduction in smoothness in the pavement through wear. And a careful analysis of much experimental work, extended over a series of years, would give up a vast fund of useful information as to the economic possibilities of different classes of pavement for different kinds of travel. Such data would also indicate clearly the period in the life of any pavement when its wear renders it unfit for further profitable use.

Such experimental work is not expensive, and would undoubtedly result in a revelation to many officials who rely on personal impressions rather than ascertain facts. No systematic and long-continued work of this character has ever been undertaken in the United States.

5th. In an ideal city, pavements should be maintained adequately, not only as a matter of good financiering, but as a matter of public convenience. It may be cheaper to build heavy pavements and let them go to pieces uncared for until they are rebuilt again. But the public wants and is entitled

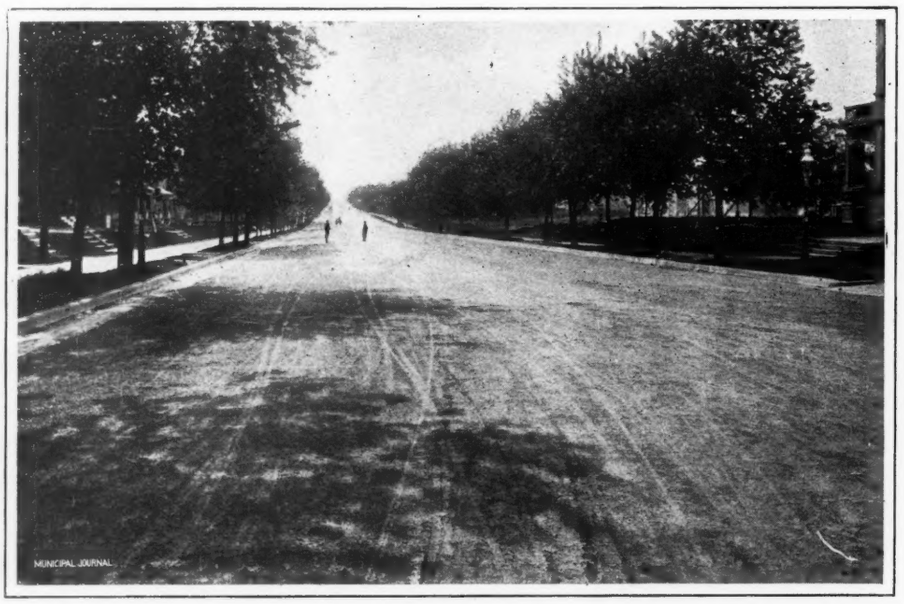
to have its pavements kept in proper condition for convenient and comfortable use. And no pavement which is allowed to deteriorate uncared for is in condition to be fit for travel.

It is fully as important, therefore, that an adequate revenue should be raised for the repair, as it is necessary to finance the first construction. Such revenue should be apportioned systematically throughout the city, largely on the basis of the street-travel census, on the theory that the wear of the pavements will be in proportion to the travel. In unfrequented streets, this is probably not entirely the case, and the elements and natural decay would have as much to do with the necessary repairs as would the travel.

The character of the pavement itself would also modify to some extent this method of apportionment, but speaking generally its basis has been found by experience to be safely indicated largely by the travel.

Adaptation of Pavement to Particular Streets

6th. An ideal city will not only select the pavement best adapted to the tonnage, but will regulate the width of its paved roadways to suit the amount of traffic. When the traffic is heavy, the roadway should be correspondingly broad. Broad streets are almost always desirable, but broad pavements are not by any means always necessary, as experts realize. In most of the cities of this country, an immense amount of money has been wasted in paving broad roadways on residence streets where light traffic prevails. Not only is first cost thus thrown away, but annual loss of cleaning, sprinkling and repairs, becomes very much larger than is necessary, and in so far as the grass plots are thus restricted, the street is thereby less beautiful than it would otherwise be.



LINDELL BOULEVARD, ST. LOUIS, THE PRINCIPAL THOROUGHFARE LEADING TO THE WORLD'S FAIR GROUNDS, PAVED WITH BITULITHIC PAVEMENT—THIS WORK IS DESCRIBED ELSEWHERE IN THIS NUMBER UNDER THE CAPTION, "THE BITULITHIC PAVEMENT IN ST. LOUIS"

Why is it that the American taxpayer should spend money so lavishly on broad and lonely pavements that do not hear the click of a horse's hoof but a few times a day, is somewhat difficult to understand. Possibly it is due to a feeling of local pride; more probably it is ignorance of the beauty of a proper street design adapted to the use it receives. It is easily estimated that in the city of Chicago alone, about $10,000,000 have been uselessly expended in disfiguring residence streets with an extra breadth of hot, glaring, and dirty pavement that is quite without any reasonable use, and which would cost to maintain and repair, a very large sum annually, if it were properly done. Not being repaired or maintained it renders the street just that much more shabby.

A width of eighteen feet affords sufficient room for a vehicle to pass, when another is standing on each side of the pavement—a rare occurrence. Most vehicles can be turned in an 18-foot space, and if occasionally one is obliged to go to the nearest corner, there is no great harm done. A turning circle in the center of a long block is easily introduced. Thus it will be seen that 18 feet is a very fair width for an unfrequented residence street, and a width from 20 to 24 feet is probably sufficient for the larger number of residence and suburban streets. A great number of streets in residence portions of our cities are one-third wider than these figures. The tonnage of the traffic in some of the business portions of Chicago rises to 15,000 tons per day, and is accommodated in some places on a 30-foot roadway, but there is hardly a residence street in which the traffic exceeds ten tons in this same time, and yet with this tremendous difference in traffic, we find but little allowance for difference of width.

7th. Good taste in street effect is quite as conspicuous as in art of any kind. Why do we not find more of it exercised on our residence streets? Let us keep the ugly high curbing to the lowest possible point. Let us depress the roadway well below the adjacent lawns, widen the grass plots, and narrow the roadway in accordance with traffic. Uniform planting of trees, as is done by the municipality in Washington, D. C., would be highly desirable. The improvement and maintenance of the parkways, the sprinkling and cleaning of the streets under the direction of the municipality, and paid for by local assessment, would be a step in advance. And the advice of a landscape specialist as to shrubbery and planting in wide avenues with narrow pavements would not be money thrown away. Occasionally in streets of light traffic, a circular park lot can be introduced at an intersection without extra expense, with very good effect. Not too often, but here and there; as opportunity is afforded.

Where traffic permits, why not solve the trolley rail question by making the central 16 feet of the street a grass plot, curbed off from the rest of the roadway by low curbing, and given over to the railway line. A crossing might

be put into the middle of long blocks, and the sidewalk space on such streets ought to be somewhat narrowed to permit of increased roadway space. Such an arrangement is not always possible, but it is possible more often than would be suspected. Accurate traffic returns would tell us when it would be safely done. In Boston and St. Louis they lay out wide boulevards with special park spaces for the trolley, and they are delightful. Above all, let us have our residence streets cleaned oftener than once a year, as is the case now in Chicago. This can be accomplished. Anything can be accomplished if we are willing to have laws passed which will enable the municipality to charge us up with the price. It cannot be done for nothing.

8th. We find in Chicago a large number of improvement associations. This spontaneous growth is an evidence of a desire for clean and beautiful streets, and a willingness to pay for them, but they are doing work which should be done by the municipality had it the means, the energy, and the forethought, and more conspicuously than all the "careful methods." Such associations are an anomaly and a reproach. Something is lacking somewhere or they would not exist. It is not wholly the revenue question; it is very largely the citizens' distrust of the municipality's mediocre results, which inspires him to place funds and special work and support in these associations rather than to work to increase the revenues of the city government.

AMERICAN AND FOREIGN CITIES

Present Tendencies—Paving in Eastern Cities—Bitulithic Rapidly Winning Favor—Practice in French, German and English Cities

By John W. Alvord, C. E.

THE present tendency of American cities is distinctly towards more luxurious pavements in the sense that comfort and convenience are consulted as well as absolute necessity.

There is a period in the early growth of every young city when it comes to realize that pavements are a necessity. Then follows the taxpayer's hunt for the cheapest available pavement that will answer the purpose. After some years of growth and experience with pavements whose first cost is low, it dawns upon the municipal consciousness that pavements are like other investments. First cost is not the only factor, operating expenses and duration of life are necessarily considered. Generally, about this time it is found that solid foundations are a paying investment. Then more durable pavements, such as granite blocks, are substituted at larger first cost. A little later yet in municipal history, comes a demand for that which represents the height of comfort and convenience regardless of first cost. On busy streets, crowded with traffic, comfort and convenience supersede all other considerations. The very best noiseless, smooth pavements, excellently maintained, are none too good. The business condition warrants it, and the public desires it, and the taxpayers can afford it.

THE SITUATION IN CHICAGO

The City of Chicago has passed through the earlier stages above described. It first looked for pavements of low first cost, and discovered cedar blocks laid on planks. Some 740 miles of cedar blocks are now found on its streets. Some of these pavements have served their purpose fairly well, but their chief recommendation, low first cost, has been accompanied by short life, and a latter end whose discomforts are past all description. Therefore, about the year 1880, attention began to be given to more desirable pavements on business streets, and the central district was paved with granite. When this pavement was completed, we had arrived at the extreme of durability without regard to comfort or convenience. To-day there are signs of discontent, because, as a city of the first class, we have come to a point in our history when we realize that in our central business district at least, with its large working population, comfort and convenience rank over all other considerations. We do a vastly greater business than we used to, and we are entitled to more quiet in which to work. We desire to walk across the streets everywhere on clean, smooth surfaces without having to pick our way, or be careful of our footing. As a city, we can afford such a condition in our business and retail center, and we are entitled to it. And let us not forget that everybody who toils in the business district helps indirectly to pay for the improvements.

This same stage of experience has been reached by nearly all of the larger American cities. Some of them realized it early, and are already provided with good, clean, smooth, noiseless pavements in the principal retail and residence quarters. Others are just awakening to the demand, while a few have hardly realized yet that they can afford a luxurious pavement. Chicago is in the latter class.

PAVING IN EASTERN CITIES

In the Eastern cities of this country, everything is tending to smooth, noiseless pavements, such as asphalt, asphaltic block, bitulithic and creosoted wooden block. The city of Brooklyn is laying 30 miles of asphalt this year, Buffalo has over 285 miles in place; New York City is laying about 40 miles of asphalt, largely over the top of granite pavement, a method which has proved quite successful there and is worthy of especial notice. Boston, with its steep grades, is still conspicuously clinging to granite for business streets, but has notable examples in the principal thoroughfares, of creosoted rectangular wooden blocks, a smooth, noiseless, and valuable pavement. St. Louis is laying bitulithic pavement, on several miles of the main approach to the exposition grounds. In 1900, the four cities of New York, Philadelphia, Buffalo, and Washington, contained 837 miles of asphalt pavement, while in January, 1903, the same four cities contained 1,033 miles, an increase of nearly 25 per cent.

It will be seen that of new pavement, the following percentages were laid during the decade:

Asphalt	33 per cent.
Brick	25 per cent.
Macadam	23 per cent.
Granite	8 per cent.
Wood	7 per cent.
Miscellaneous	4 per cent.

Since 1900, the tendency is still more marked towards the smooth and noiseless pavements, not only for business streets, but for residence streets, where rental values are easily affected by the character of the pavements.

Practice in French Cities

The larger European cities arrived at the point in municipal history more than a generation ago, where comfortable and convenient pavements regardless of first cost were deemed necessary.

In Paris, 50 years ago, all the pavements were either cobblestones, block stone, or macadam, the former in those sections where travel was heaviest, and the latter where travel was relatively light. As travel increased, block stone was substituted until in 1894, 71 per cent. of the pavements of Paris were of block stone, and only 16 per cent. of macadam.

The desire, however, in certain sections for a pavement which would obviate the noise of the one and the dust of and mud of the other, has led to the introduction, first of asphalt, then of rectangular, close-fitting wooden blocks. Asphalt streets date from 1837, but it was not until 1855 that the methods of to-day were introduced. Wood pavements were first introduced in 1881 for the heavy traveled boulevards, and even ten years ago, there were 3.8 per cent. of asphalt and 8.4 per cent. of rectangular wooden blocks.

The tendency in Paris of late years is increasingly to substitute asphalt and rectangular wood block, mainly the latter, for block, stone, and macadam, especially for macadam. In certain outlying parts of the city, macadam will be retained, and in other streets from the nature of the traffic, block stone is still preferred, but the use of wood is decidedly on the increase, and it is obviously the favorite as it is accounted smooth, noiseless, agreeable to drive over, easily kept clean, and is rapidly relaid when worn out.

Asphalt is considered by the French engineers to have all these advantages, but it has the disadvantage of being rather slippery when wet. Its use is, in general, restricted to narrow streets less open to the sun and winds, while wood is laid on broader streets to which the sun and wind have free access. In Paris, horses at all seasons are shod smooth, a local custom, the reason for which is not apparent, as there seems to be no law requiring it. It undoubtedly diminishes the wear on both asphalt and wood, but necessitates the sprinkling of sand or gravel whenever the surface becomes slippery from any cause.

The excellence of the street pavements of Paris and the unusual amount of care bestowed upon them by the intelligent and highly educated officials in charge, justify the most careful study on the part of American municipalities.

Practice in English and German Cities

In London, where wood pavements predominate for streets of heavy traffic and main thoroughfares, where comfort and convenience are demanded, and is the favorite pavement, creosoted blocks are largely used, but certain hard woods from Australia, known as karri and jarrah wood, are coming to be extensively used. It will be remembered that, both in London and Paris, the bulk of the traffic consists of large three-horse omnibuses, weighing about 12,000 pounds when fully loaded, with speed varying from five and one-half to six and one-fourth miles per hour. This traffic is very destructive to the pavement, and in American cities in entirely taken up by the street car rail, which, when not of the grooved pattern, also carries from one-fifth to one-third of other traffic as well as the passenger traffic.

The life of London wood pavements is estimated at from ten to twelve years under these severe conditions, but they are very carefully laid and maintained, and promptly replaced when they wear through. Macadam and Telford pavements are extensively used in London, being laid and maintained by day labor at great expense.

In Berlin there is very little wood pavement, but the principal streets in the business portion of the city are paved with asphalt, which is well laid and maintained in constant good order.

Frankfort, Hanover, Bremen, Cologne, Leipsic, Dresden, and Hamburg are largely paved with stone block, but the principal streets are paved with asphalt, and there is some wood pavement. Streets about docks, depots, and warehouses are invariably paved with stone block carefully laid on solid concrete foundation.

Most of the smaller English cites outside of London are paved with stone block. In Liverpool and Manchester there is an increasing demand for wood pavements, which are there considered very desirable improvements, as the moist and damp climate of England renders asphalt a rather more slippery pavement than is the case elsewhere.

Glasgow and Edinburg on their older streets have carefully cut and set stone blocks laid on concrete and maintained with great care. Both are hilly, and therefore asphalt is limited in use to certain level streets where quietness and cleanliness is a desideratum.

Everywhere the main result is the same. So soon as wealth and population increase to the point where luxury and comfort can demand it, the economical and more durable pavements of stone and granite on heavily traveled streets give way to pavement of shorter life and higher maintenance cost, but of immensely greater comfort to the public in the cessation of noise, smoothness for traffic, and ease with which they may be kept in condition.

THE AVAILABLE PAVING MATERIAL

Full Information as to All Points of a Good Pavement Is Lacking—The Only Available Pavements Are Asphalt, Wood, Brick, Bitulithic and Stone

By John W. Alvord, C. E.

WHILE but little study has been made of the broader principles underlying the art of street improvement, or data on the traffic streets must sustain, a large amount of literature has been developed as to the materials of pavements, their constructive details and first cost. This is the only field which the municipal engineer has been allowed to occupy undisturbed, and he has covered it with great detail and minuteness, and placed on record a large amount of useful information. It is not the purpose here to do more than present, in a brief review, the salient features of various kinds of available pavements, so that they may be intelligently assigned to the various classes of improvements outlined in part two of this report.

In reviewing the literature of this part of the subject, it may be desirable, first of all, to note that a considerable portion of the information available is to be credited to the contractors for monopolies, or the promoters of property interests in materials, and therefore, while excellent in its way, subject, nevertheless, to certain bias, and should be accepted somewhat guardedly.

FULL INFORMATION AS TO ALL POINTS LACKING

A second thought which cannot be too strongly impressed is that available information as to wear and durability of pavements is quite incomplete because of the absence of data as to travel, amount of repair, duration of life, and accurate statement of final condition. As a consequence, while we have knowledge as to first cost, no one can have much foundation for exact opinions as to the expense of operation and renewal of pavements upon which all real comparison depends. Hence the great variety of empirical ideas which we find expressed on this subject.

A third warning may be uttered to those who have preconceived ideas on this subject. The apparent failure of pavement to meet expectations under every condition should not work final condemnation. Each pavement has its strong and weak points, and if placed in unfavorable environment will not develop its best qualities.

With these cautions it may be well to attempt to outline, in only the most general manner, the strong and weak points of some of the better known and well tried forms of pavement, bearing in mind that upon this subject there are recently published volumes of well arranged material accessible to any one who is interested in the matter.

ASPHALT

Asphalt pavements are a popular, high-class pavement, comparatively noiseless, reasonably elastic, smooth and cheaply cleaned, and reducing the force for action to a moderate amount. When unclean and wet they are more or less slippery, but nevertheless, even then, they give usually ample foothold for horses except upon steep slopes.

Asphalt itself is a variable material, the only reliable test of which is its action in the pavement. Such pavements have frequently failed, but it is to be remembered that the industry is new and has been rapidly developed in less than thirty years to the point where there are now about 2,000 miles of street, representing an investment of over $100,000,000, in this country alone. The wearing surface of asphalt pavement is composed of 90 per cent. of sand or mineral matter, the asphalt being the cement that binds it into a tenacious and elastic coating. If, for any reason, such as improper preparation, age, or volatilization, the cementing quality of the asphalt disappears, the pavement disintegrates, cracks, and is rapidly worn or broken down. The general tendency of asphalt pavement to decay will be indicated by its loss of elasticity, during sudden changes of temperature, cracks forming during cold weather, and particularly during extreme drops in the temperature. This pavement is particularly sensitive to the action of the sun's heat, and to the combined action of rain-water, acids, oxygen, and frost. Under such conditions it gradually loses its cementing power. It is an interesting fact, however, that asphalt pavements wear better and last longer when they are subjected to a considerable amount of travel. The elasticity of the pavement seems to be promoted and prolonged by use. Asphalt pavements require a considerable plant for their preparation, and experience and care in their construction, and are not a cheap pavement, either in first cost or operating expense.

Owing to the uncertainties of the manipulation of asphalt, a large number of cities in this country have adopted the method of laying it under a guarantee for a period of five, ten, or fifteen years, during which time it is repaired at the expense of the contractor, and the amount so expended charged into first cost. This method confuses the data connected with operating expense, and as the periods vary in different cities, renders it difficult to make proper comparisons, especially as it is common to make the guarantee period uniform all over a given city regardles of whether travel is heavy or light.

This method of long guarantee periods has its advocates and its critics about evenly divided. The real problem of repair by the municipality begins after the termination of the guarantee, and is a question interesting many municipalities at this time. Should cities let out repair by contract, or should they establish heir own asphalt plants, and do their own repair work? With such plants established, the further question is raised as to the expediency of the doing away with the guarantee period and performing all repair. A valuable recent report of Mr. Tillson, Chief Engineer, Street Department of Brooklyn, is of interest as bearing upon this question. The city of Winnipeg has successfully established such a repair plant, and in other cities, notably Montreal and Brooklyn, they are being urged.

Asphalt pavements, consisting of only a binder coat and

finishing coat, are laid in New York City as a cover to the older granite and stone block pavement, and it is claimed that the roughness of the older stone pavements forms an admirable bed for the asphalt coat, from which it does not easily detach itself, as would be the case with smooth concrete foundation.

Finally, then, asphalt pavements are particularly desirable on high class residence streets, public squares, and retail shopping streets, and even wholesale streets, with heavy traffic when noiselessness is to be desired. They are not unduly expensive for unfrequented residence streets when the width of roadway is adapted to the amount of travel. Asphalt pavements are not economical on streets of excessively heavy traffic, such as occur in the vicinity of docks, freight depots, and warehouse districts with a large amount of heavy teaming, and they are particularly to be avoided in the vicinity of street car tracks using the old-fashioned flat rails.

Stone Pavement

Granite and stone block pavements have been the pavements in earliest and most common use. In their recent form they were introduced into this country about 1850. When carefully cut and set granite blocks are laid on solid foundations of concrete, it forms unquestionably the most durable pavement known, and has been the standard pavement of most European cities. Such a pavement is less laid than formerly, and the output of granite block has decreased one-half of recent years; asphalt, brick, and wood taking its place to a large extent.

It is found that the hardest stones will not necessarily give the best stone pavement, since a very hard stone usually wears smooth and rounded, and becomes slippery. A hard stone may be necessary under very heavy traffic, but under medium traffic a soft stone may give more satisfactory results.

Stone pavements, as laid in Chicago, after some wear become smooth and uneven. They are difficult and expensive to keep clean, and afford a very poor foothold for horses in wet weather, the hoof constantly slipping back until the calks engage a joint. But one of the greatest objections to stone pavements is the noise produced under heavy or medium travel. Such pavements will tend to reduce rents in residence streets which are much traveled, and are objectionable for the same reason in quarters of the city devoted to office buildings, the vicinity of large working populations or industries where quiet is desired.

Stone pavements, are therefore, desirable only in streets of the heaviest freight traffic, such as are described in Class II of this report, as being in the vicinity of docks, coarse freight warehouses, freight depots, and streets where very heavy trucking is necessary, and where noise can be tolerated. They are also a desirable pavement to lay in car tracks, as no other pavement so easily takes up the peculiar shocks, and is so readily repaired, in such situations. They are also well adapted to steep approaches of bridges and viaducts. European cities take more care of the dressing of stone blocks for pavements than is the case in this country, so that the blocks fit more closely together. In many cities, notably in Liverpool, the size of the blocks are reduced to a dimension more suited to the foothold of horses than is the case with the blocks used in Chicago.

Brick Pavements

Are a comparatively old form of pavement which has had a notable revival developed out of the necessities of the central western part of this country, where suitable paving material is deficient over very large areas. A new industry has practically been created in the last fifteen years, until there are now nearly two hundred plants devoted to the manufacture of paving brick. Most of the smaller cities of the Central West early in 1885 to 1890 paved their business streets with brick, and the larger cities following, Philadelphia being in the lead to-day with over one hundred and thirty-five miles of brick pavement. In all parts of the country the use of brick for residence and light traffic streets is rapidly increasing, and about as much brick pavement is now in progress as granite block, asphalt, and wood combined.

A vast amount of experience has been accumulated upon the manufacture of tough, selected clays into suitable paving brick, and its construction into competent pavements. The pavements of to-day are a great advance over the earlier experiments, and are very satisfactory for even fairly heavy traffic.

Brick pavements afford a good foothold for horses, and do not become slippery by wear. They are adapted to all grades, and some experiments by Prof. I. O. Baker seem to show that the tractive force required upon them is less than upon asphalt. This must be in comparison with soft asphalt, rich in bitumen, such as is adapted to carry out long-term guarantees. Brick pavements are easily and economically cleaned, and are easily repaired. They may be laid in connection with street car tracks without disadvantage, and are not so expensive a pavement as asphalt or granite.

Brick pavements are perhaps not adapted to the heaviest travel, and are not as noiseless a pavement as asphalt or wood, therefore they are adapted to the classes of streets III, IV, and V, described as second-grade business streets, arteries of communication with the country, and possibly, in some cases, well traveled high-class residence streets. They form an excellent material for the pavement of alleyways, courts, and squares, and in general are an excellent intermediate pavement as to durability between the granite block of heavy travelel streets and the macadam of country roads.

Wood Block

Wood block pavement, as known to Chicago, consists largely of rounded cedar blocks with the spaces filled with gravel and coal tar. The remains of seven hundred and thirty miles of such pavement still exist upon the streets of the city, most of which has been in wretched condition for some time past. The main and inherent defect of circular wood block pavement is the fact that very wide spaces occur at most points between the blocks, the result of which is that the edge of the circle is quickly worn down, and the block becomes rounded or conical in shape. So soon as this result is reached, all the comfort and ease of the pavement is gone, and unfortunately only a moderate amount of travel is necessary to bring the pavement into this condition. Repairs are of little or no avail, as they cannot be made so as to replace the comfort of the original pavement, or even lengthen its life to any considerable extent.

The second fatal error of judgment has been that the proper use of wood pavements has been entirely misunderstood in Chicago.

Wood pavement fails either through excessive wear or natural decay. Unless the wooden blocks are of hard material, or are protected by some preservative process, their life is comparatively short in any event. The cedar blocks in use in Chicago, although more durable in wet ground than any other wood, have generally contained from twenty-five to thirty-five per cent. of sap, which renders them less durable against decay, and of less strength to resist crushing under traffic than hard wood. But wood pavements in Chicago have been placed in environments entirely unsuited to the peculiar advantages of this form of pavement. Miles and miles of street have been paved with cedar blocks where there was little or no travel to be carried, and the result has been that the pavements have decayed away rather than worn out. Such light traveled streets should always be paved with a material which will not naturally of itself deteriorate, so that the renewals due to the wear of travel only would be necessary, and wooden pavement, if used at all, should only be used by laying close fitting wooden blocks upon streets of heavy travel, where the wear will terminate its life before decay sets in, and where its obvious advantages as a smooth, noiseless, and comfortable pavement can be most appreciated. This is the way wood is successfully used in London and Paris, where rectangular, close-fitting hard wood or creosoted blocks are laid upon a solid bed of concrete, forming a pavement which wears down without rounding the blocks, or even becoming very rough. Such wooden pavements, properly laid, are the favorite high-class pavement abroad, and that, too, under conditions where travel is far more heavy than anything we have in Chicago.

Quite recently the city of Chicago has laid down two samples of creosoted wooden blocks after the London type. One of these is on Michigan avenue, in front of the Auditorium, which was put down in 1901, and is well worth inspection by those interested in this subject. Another sample is to be seen upon the Rush street bridge. The life of such pavements in London under heavy traffic has been known to exceed nineteen years, and loans upon them are permitted up to twelve years and as they are only laid where they will wear out rather than decay, they form an admirable high-class pavement, and are carefully kept in repair and promptly renewed when necessary.

It is probable that the city of Paris has to-day over seventy-five miles of such pavements in the central streets of heaviest traffic. These have cost, on an average, about $3.47 per square meter, and the cost of maintenance is about 2.9 cents per square meter per year. The city of London has perhaps over one hundred miles of such pavement in use on streets whose travel is much greater than anything we know in this country.

The city of Indianapolis has a considerable amount of creosoted wooden block pavement, which has been down some four or five years, and which is said to be very satisfactory. Its use is extending there.

With a few other notable exceptions, wood pavement is at the present time in disrepute in the Central States, due to its misuse on such a large scale as has occurred in the past twenty years in Chicago and other Western cities. It is believed by many conservative engineers and city officials that this disrepute is unwarranted, and that wood pavement properly protected and suitably laid on solid foundation has its field of usefulness as a convenient, noiseless, and comfortable pavement in streets of heavy travel, where first cost is not the most important factor, and where the highest kind of comfort is demanded.

Macadam

Macadam, or broken stone, pavements were originated in England, and are universally used as the pavements for country roads. They consist essentially of several layers of crushed stone varying in size from large cubes at the bottom for the foundation course, to fine crushed stone as the binder or finishing course. When well wet and rolled with a heavy roller, the entire body is compacted into a more or less solid mass which forms admirable surface for light or unfrequent travel.

Macadam pavements are not, strictly speaking, a city pavement, as they are not adapted to the conditions of heavy travel in city streets. Their principal objection is a rapid wear, which produces accumulation of dust, requiring them to be almost constantly sprinkled.

In wet weather the dust is converted into thin pasty mud, all of which is out of place in a city street. Nevertheless, there is a large outlying area in every city where the travel is quite infrequent and the character of the street shades off into the type of country roads. In such localities a macadam street is both desirable and appropriate.

Where travel is so light that pavements commonly subject to decay would have their life terminated from that reason rather than from actual wear, macadam forms a pavement low in first cost, and which may be renewed from time to time without being rebuilt. It is, therefore, the pavement of all others to be used where first cost is an important consideration, and in districts where the lightest travel prevails, and where some dust and mud may be tolerated.

The laws of most of the cities of this country are totally unsuited to the use of macadam pavements, because they do not provide funds for adequate maintenance and repair. The result has been that in providing for macadam pavements engineers have been accustomed to providing very thick and expensive pavements in first cost with the expectation of giving them as long a life as possible under ordinary conditions of neglect. The result has been unfavorable to the popularity of macadam, as might be expected. Indeed, no pavement survives criticism under such circumstances.

Much may be learned about the proper construction and maintenance of macadam pavements from the studies of French engineers, who have brought this branch of road-making to a high state of perfection through elaborate tests, reports, and long experience.

The Massachusetts Highway Commission has also done much in the last four or five years to determine the best kind of stone, proper thickness, and construction of macadam roads, and its reports should be consulted by every student of this subject.

Macadam pavement, then, should be confined to parks, boulevards, and the lighter, unfrequented classes of residence

streets and the suburban portions of great cities included in Class V.

Bitulithic Pavement

A new form of pavement, known as bitulithic pavement, or bituminous pavement, has been successfully introduced in the last few years, and is causing great interest among paving officials.

It consists essentially of broken stone so graded as to size that the voids are brought to a minimum. The stones are then heated, and mixed by machinery with a bituminous cement essentially like asphalt. The mixture is hauled to the street, and while still hot spread on the foundation so as to give a uniform thickness and grade and rolled and rerolled with a heavy steam roller. The pavement appears to have all the elasticity of asphalt, although it does not present so smooth a surface. It gives apparently a better foothold for horses, with, nevertheless, a low tractive resistance. It seems to be adapted to much steeper grades than is asphalt, and it is claimed that it has a much harder wearing surface and a longer life.

This pavement is being laid on the Dell Mar avenue, a principal street leading to the fair grounds in St. Louis, and has been under observation on exceedingly steep grades in Boston, Mass., near the State House, where, after nearly two years' use, it is still unmarked by travel. Such a pavement as this would seem to be a logical outgrowth of experience, and must inevitably have an interesting future.

OWNERSHIP OF MUNICIPAL MONOPOLIES

With Especial Attention to Electric Lighting—More Than 600 Municipal Lighting Plants in United States—An Argument for City Ownership and Operation

*By Otto H. Leber, A. B.**

At a time when the political morals in our cities are as lax as they ever have been, when the civic ideal seems entirely to be lost sight of, and when the right of franchise on election day seems to have changed from being a privilege to a burden, it may seem particularly inappropriate, if not unwise, to urge the adoption of what would probably appear to many to be an increase of the annual political spoils and the adding of another baneful influence to our already sufficiently demoralized municipal governments.

Such, in the judgment of a great many people, would be the immediate effect of the adoption of public ownership of electric lighting or any other municipal monopoly.

More Than 600 Municipal Plants in U. S.

However, when we see that more than 600 cities in the United States have established their electric lighting plants, and when an expert engineer tells us that the city of New York alone could save $947,000 a year, if it made its own electric light, we must be convinced that the problem from its wide scope as much as by its contiguity of interest merits more than a cursory examination.

A noticeable fact of the last few years has been the ever-increasing prominence which city after city of this country has been attaining, a position which would be the more enviable for each, did it derive its source from anything but a sudden discovery of the most flagrant corruption in one of their departments. Closer scrutiny of these municipal scandals will show that many, it would be safe to say most of them, are caused by the corrupt relations between the city government and public service corporations. Now it must strike us immediately that in the face of human nature such a course of events is not only natural, but really cannot be otherwise. The great public service corporations are owned by well-to-do and influential citizens, and we should wonder indeed did these people look to the welfare of their fellow citizens at the expense of their own private interests. Such personal selfishness must, of a necessity, act to the detriment of the service rendered. The interest of a stockholder is directly opposed to that of a citizen, and his dealings with the city show it. Such a reason makes it worth our while to see whether anything can be substituted for private ownership of municipal monopolies, and whether public ownership, which I mean to substitute, upholds this theoretical reason, and has to support it sufficient practical advantages to make its substitution in some branches advisable, or at least worth a fair trial.

In the last century the functions of government have slowly widened in scope. Highways and bridges have come under control of the State and are free to all; cities commenced to take the sewage problem into their own hands, and the problem of water supply, as being of almost equal importance, soon occupied their attention. Now it may be said that there is a great difference between supplying a city with good water and running an electric lighting plant; and it may also be argued that it is not for the city to venture upon experiments and into fields that properly belong to private commercial companies. But, as well stated in a paper on "Municipal Electric Lighting," by Prof. John R. Commons: "A criticism should certainly be made upon those cities which entered upon municipal electric lighting eight or ten years ago. Here was a new agency, utterly unknown as a commercial quantity; new machinery of all degrees of imperfection; cost of operation; depreciation, risks, unsettled * * * Fifteen years, however, of experience and marvelous progress have reduced electric lighting to a system and made all its details as readily calculable as any functions in which cities are now engaged."

In a paper on government ownership, by Prof. Seligman, the whole problem is summarized thus:

"Government ownership depends: I. On the existence or non-existence of a widespread social want. II. On the amount of capital invested. III. On the complexity of management."

* Authorities consulted: Bemis: Municipal Monopolies; Parsons: The City for the People; Yale Review, Municipal Affairs, Arena, Political Science Quarterly, Quarterly Journal of Economics, Annals of American Academy of Political Science, Bulletin of Department of Commerce and Labor.—[Author.

PROFITABLE COMBINATION OF WATER AND LIGHT PLANTS

None of these limitations would bar out electric lighting as a function of city government. The efficiency or non-efficiency of this service surely is of importance to all citizens, the initial investment is by no means prohibitive, and what is more, it has been found that an electric lighting plant, especially in smaller cities, can be combined with the water works to great advantage and with proportionately slight additional expense of maintenance. A dozen cities at least have already consolidated these two branches of service.

One of the dearest and most characteristic of American principles is that of the least government interference in public affairs. So much so indeed, that a proposition of the kind suggested must be supported by unquestioned fact would it not be received with suspicion and disfavor. He who dares suggest such a plan is met with the time-honored arguments, "Socialism and Politics." But the former has ceased to be a bugaboo for progressive communities, and can hardly be presented any more in the face of the splendid record of our socialistic Post Office Department, which even the corrupt practices of a few, so lately come to light, cannot destroy. As regards politics, the acquisition of such a plant would tend to be an increasing influence to keep the public service free from that taint.

People argue that we should wait until the civil service system is more firmly established in our cities. If we wait for perfect city government before embarking on an enterprise of this kind the delay will be long. Rather will an extension of the activities of our cities tend to rouse our citizens to a demand for the perfection of the service when they see that they are directly affected at every hour almost of their daily lives. Moreover a public plant could hardly be more conspicuous in politics than the private ones are to-day, who are in continual fear of hold-ups and are kept busy barring out competitors when they are not renewing their franchises or contracts. It is the opinion of Dr. Albert Shaw, one of the well-known students on this subject, that "the corruption caused by corporations has given us the weak and flabby State and city governments that we have to-day; and that the pressure brought to bear on the government to produce corruption under municipal ownership is incomparably less than under private. To give a practical example that the spoils system and machine politics play no part in the management of public plants, a report of the Detroit municipal electric lighting plant tells the following: The number of employees there instead of being increased has been reduced from 112 to 105, although the output has been doubled in the eight years of its existence, and 40 per cent. of the present staff have been in employ since 1895."

PUBLIC OPERATION MORE ECONOMICAL THAN PRIVATE

It has always been claimed that in any business undertaking such as this, private control must from the very incentive of personal profit be able to furnish service at considerably lower rates than could be offered under the slow and unprogressive machinery of public management. Public plants, people say, could only be made to operate successfully under certain "peculiar conditions," some are of the opinion that only large cities are favorable for its adoption, while more argue that smaller cities are the better fitted. Hence, to judge the problem fairly, we might take typical cities of different sizes in different parts of the country, and which are operating their own electric lighting plants, and by comparing the cost of their service with cities of similar size under private control, endeavor to gain an idea which of the two modes of operation seems the more economical.

As a typical small city of the East, the city of Taunton, Mass., might be taken. It has been operating its own electric lighting plant for a number of years. From figures taken from the report of the Massachusetts Board of Gas and Electric Light Commissioners for the year ending June 30, 1900, this city consumed 181,031 kilowatt hours in 1900, for which it paid, including operating expenses, interest and depreciation $14,934, giving a cost of 8.2c. per kilowatt hour.

The three cities of Quincy, Pittsfield and Gloucester, whose population lies within a few thousands of that of Taunton, might be taken for a fair comparison. From figures taken from the same source, the price charged per kilowatt hour in these three cities is 14c., or about 75 per cent. in excess of the rates existing in Taunton. The lowest cost to any of these cities is that in Pittsfield, where the rates are 11.3c. per kilowatt hour.

The largest city which has yet ventured to operate its own lighting plant is Chicago, and in spite of the fact of its being under "peculiarly unfavorable conditions" it has had a remarkably successful record. Mr. E. B. Ellicott, manager of the plant, summarizes a report thus:

Rented service for 15 years would have cost	$3,535,875.50
Building, operating and maintaining the service has cost	3,400,663.05
Actual expenditure saved	$135,212.45

This means nothing less than that, after fifteen years of service, the city has saved over $135,000, possesses as a valuable asset one of the most efficient of plants, and, furthermore, has the incalculable advantage of being able to render good service and great satisfaction to its citizens.

The public plant in Detroit serves as another remarkable example of successful municipal operation. Before the opening of the plant in that city the private company charged annually $132 per arc. Under public ownership the price has steadily decreased from $100 in the beginning to $63.82 in 1902. At the present rate of earning this plant will have paid for itself within the next three years. Mr. J. E. Lockwood has also figured out the record of this plant, but on the basis of an especially low offer of the private company when threatened with the alternatives of public operation, but even on this figuring the saving represents almost half a million. The city of Allegheny, Pa., was paying $180 per arc before public operation began; the total cost to the city now is but $75. Jacksonville, Fla., which also furnishes light for commercial purposes, pays for street arc lights less than one-quarter of the former private rates, while the commercial rates have been reduced to one-half and even one-quarter of previous ones.

MISLEADING FIGURES OF THOSE OPPOSED

With such results, one might well ask what figures do the opponents of the city ownership bring up in their defense? If we look at some calculations which they have made we see that their figures are as much in favor of private ownership as those presented above are against it. A compar-

ison drawn up by Mr. H. A. Foster of fourteen typical cities supplying their own light with fourteen similar ones supplied by private companies shows that for incandescent light the average price per lamp hour as offered by the latter is the cheaper by .86c. Mr. M. J. Francisco has prepared a similar table, according to which without exception the private companies furnish cheaper light than the public ones. Examining the methods by which all these calculations are made, we see that in the matter of operating expenses the figures of both sides are approximately the same, but that the fixed charges vary from 0 to 15 per cent. The most moderate of the advocates of private ownership compute interest at the rate of 6 per cent. and figure depreciation at 7½ per cent., these two being the most important items under fixed charges. Now while a list of private companies shows that they pay a rate of interest of between 5 and 7 per cent., there is no doubt whatever that cities can borrow money for 3 per cent., though often paying as high as 3½ and 4 per cent. If this one and evidently fair correction be put in the table as compiled by Foster himself, it lowers the cost of city light from .86c. above, to slightly below the private rates.

Further it seems that the depreciation charge of 7½ per cent. on the entire investment, and without a corresponding reduction of the principal each year, is just as unfair. Again, Francisco quotes electrical engineers who declare that depreciation on engines and boilers is 5 per cent. and on electrical equipment and lamps 10 per cent. If we take the Chicago plant as an example and apply these percentages we obtain the following figures:

	Investment.	Per cent. of depreciation.	Amount of depreciation.
Lands	$100,000	0	.....
Buildings	66,987	5	$3,349.35
Steam plant	95,518	5	4,775.90
Electric plant	58,075	10	5,807.50
Lines	317,040	5	15,852.00
Lamps	41,240	10	4,124.00
Tools and furniture	610	10	61.00
Supplies	8,840	0	0.00
Total	$688,310	4.9	$33,969.75

By thus applying the percentage of the strongest advocate of private ownership we get a rate of depreciation of barely 5 per cent., and applying this and the interest rate of 4 per cent. to Foster's table, we obtain a price per lamp hour lower by .54c. instead of one higher by .86c. Even these figures are anything but fair to the public companies, for the depreciation rate, as figured by private companies in their own accounts, rarely goes above 3 per cent., and for the eight years from 1890-98 the average depreciation figured by the eighty-three private companies of Massachusetts was only 2 per cent.

MUNICIPAL PLANTS RUN ON BUSINESS METHODS

Thus we cannot but be convinced that in spite of what is generally said to the contrary municipal plants seem to be run on sound business methods, and by doing so have achieved success. Their rates not only are no higher, nor do they pay higher wages as we might naturally think they would, and they render their capital even more productive than that of private companies. Thus a report on Central Electric Lighting and Power stations published by the Department of Commerce and Labor shows by collection statistics in regard to daily rates of pay in all electric lighting stations in the country, that the proportion of wage earners receiving higher rates of pay is greater in private stations than in municipal ones. To determine whether municipal or private plants earned better net returns on the invested capital, we can again compare the city of Taunton with the three similar cities of Quincy, Pittsfield and Gloucester. The net earnings of the Taunton plant amounted in 1900 to $20,642 or 13.6 per cent. on the investment of $150,000. The three cities under private control could show earnings of only $51,769 on an investment of $506,043, amounting only to 10.3 per cent.

As we leave the financial side of the question, the superiority of public stations tends from nature of their management to become more evident. First, with regard to the facilities offered, it is in this as in all other kinds of service. We see private schools erected where they will pay, private telephone and telegraph companies established where there is a surety of good business, public schools are built where there are children, the Post Office penetrates the most thinly settled districts, and so it holds good with water drains, gas pipes and electric wires. Prof. Bemis in visiting a great many cities questioned while there all the citizens he could meet, also those on trains to and from them, and found that general satisfaction prevailed over municipal operation and that no one thought that corruption had increased as a result of it.

The number of outrages reported in the different stations is almost invariably very much smaller in municipal than in private stations. We cannot but then infer that the establishment of the 815 public electric lighting stations in the United States has signified for the cities supplied, a general improvement in the quality of the service rendered, and a resulting increase of satisfaction to citizens; that they have furnished not only better but cheaper light, and finally and what is of most importance, that they have been a growing influence for the bettering of municipal government by diverting the interests of citizens from private corporations to the city. Without such influence we see that the result in America has been that the city has been thought little of, and its management has been left, generally speaking, to a low class of politicians, with the result that they have become corrupt and weak. In England where we see public ownership of municipal monopolies developed to a high degree, the function of cities has been highly conceived and has attracted good men to the city offices. The only way to purify American city government is to exalt and expand the city's function. To those who say that any such attempts are dangerous to the city's finances and prohibitive of political unrest, the foregoing figures will show that the electric lighting industry from the simplicity of its management, from the comparatively small cost of its establishment and its appeal to every day needs, is an ideal only for a city to gain experience before gradually entering into the field where it will be a thing unknown to give away streets to private street Railway Companies, or allow water, gas and electric lighting to be furnished by those whose first thought is dividends and then only public convenience.

PORTLAND CEMENT*

Its Uses in Engineering Construction—Constitution of Cement, Continued

By E. Kuichling, C. E.†

In the preceding four numbers of THE MUNICIPAL JOURNAL AND ENGINEER, abstracts of the most important researches concerning the constitution of cement were given, and in the present number the abstract of the latest investigations of Prof. S. B. Newberry is concluded.

FORMATION OF CALCIUM SILICATES

Newberry also made many other experiments with mixtures of pure lime and silica heated to different temperatures, to determine the stage when the combination of these two substances takes place. For this purpose he tested the different products for free silica. The quartz slurry which he used in his experiments contained 98.32 per cent. of insoluble silica by test with soda and dilute hydrochloric acid, while good Portland cement contained only 0.40 per cent. by the same test. The mixtures were mono-, di-, and tricalcic silicates, along with ($2.5CaO$, SiO_2), and were heated variously from 2 to 6 hours at red heat and 1 hour at white heat.

The quantity of insoluble silica contained in the different products ranged from 26.32 to 0.05 per cent., decreasing both as the quantity of lime and the intensity of the heat increased. All of the products except ($2.5CaO$, SiO_2) and ($3CaO$, SiO_2) which had been burned for 2 hours at red heat, showed no rise of temperature after being pulverized and moistened with water, and pats made therefrom remained sound after exposure to steam. The lime thus appears to have entered wholly into combination with the silica, but none of these products made at red heat had any preceptible hydraulic property.

This investigation throws new light on the combination of lime with silica. It has hitherto been assumed that in the process of burning, mono-calcic silicate was formed first, being considered the most easily fusible combination, and that as the product became more basic by the absorption of more lime, it became less fusible. These experiments, however, indicate that the reverse is the fact, since by heating a mono-calcic silicate mixture for 2 hours at red heat, the product was approximately di-calcic silicate and free silica, and by similarly burning a di-calcic silicate mixture the product was approximately tri-calcic silicate and free silica; also that by raising the temperature of these mixtures to white heat, the free silica will be almost wholly absorbed.

In the case of the ($2.5CaO$, SiO_2) and ($3CaO$, SiO_2) mixtures, all of the silica enters into combination after burning for 3 hours at red heat, but some of the lime remains free, as shown by a rise of temperature when water is slowly added to the resulting powder. If, however, these two mixtures are burned for one hour at white heat, all of the lime enters into combination.

These experiments thus confirm Le Chatelier's opinion that Portland cement is composed mainly of tri-calcic silicate, which is the active constituent in the process of induration; and that to render its formation as a dense crystalline mass possible at the temperatures obtained in the usual kilns, a flux of some kind, such as alumina or iron oxide, is necessary, in which event the tri-calcic silicate separates in the form of crystals, which are embedded in a non-crystalline mass or magma of indeterminate composition.

COMPOSITION OF THE MAGMA OF CEMENT CLINKER

In relation to the composition of the magma found in cement clinker, there is much diversity of opinion. Le Chatelier, Meyer and Ludwig, regard it as consisting essentially of silicate of alumina, iron and lime, while in his first paper of 1897 Newberry considered that it was mainly a di-calcic aluminate. Meyer and others, however, deny that normal cement clinker contains any such aluminate, and propose a combination of silica, lime and various sesquioxides, the latter being briefly designated $R_2 = (Al_2 + Fe_2 + Mg_2 + \&c.)$, and the combination ranging from (SiO_2, R_2O_3, CaO) to (SiO_2, R_2O_3, $6CaO$). By this assumption the subject of the composition of the clinker is greatly simplified, and a means is afforded of explaining differences in the composition of cements of equally good quality.

Newberry considers it wrong to include the magnesia, iron oxide and alkalies in a formula for making cement commercially, as experience has demonstrated that the proportional mixture of a good cement must be computed only on the basis of lime, silica and alumina, and that all other substances contained in the raw materials should be regarded simply as impurities which do not affect the proportions of the three principal ingredients. Furthermore, the analysis of a commercial cement is considerably affected by the presence of the ash of the fuel used in burning, as shown by Candlot, Erdmenger and others.

Ludwig maintains that the iron in cement is present in the form of ferrous oxide (FeO), and does not act as an acid; but this has been disproved by Loebell and others, as well as by Le Chatelier's production of calcium ferrite with 2 and 3 molecules of lime. Newberry found that di-calcic ferrite ($2CaO$, Fe_2O_3) was a black glassy substance, yielding a brown powder which hardens well in steam and water. Numerous ferrites have also been made by other chemists, such as (MgO, Fe_2O_3) by Devill and (CaO, Fe_2O_3) by Percy, the latter forming large crystals having a metallic lustre and a specific gravity of 4.693. The minerals called magnesite and franklinite can also be regarded as ferrites. Schott found that both the alumina and the ferric oxide (Fe_2O_3) in cement acted like gypsum with respect to cracking or change of volume.

Newberry further remarks that if Portland cement clinker, at white heat, is quenched suddenly in cold water,

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it will have a bright yellow-ochre color, and after being dried it will yield a yellow powder having normal hardening properties. On the other hand, if the same clinker is allowed to cool from white to red heat, and is then quenched in water, it will have a black color. This difference in color must be attributed to some unknown change in the character of the iron compound while cooling from white to red heat.

He is also satisfied that the constitution of the combinations of alumina and ferric oxide in cement clinker requires further experimental investigation. As a matter of fact, all first-class Portland cements contain more lime than is necessary to combine with the silica to form tri-calcic silicate; but if the ash of the fuel used in burning can be excluded from the product, satisfactory cement will be obtained with only sufficient lime to form tri-calcic silicate, di-calcic aluminate and di-calcic ferrite. For this reason he does not agree with Meyer in considering that the magma of cement clinker consists of silicate of alumina, iron and lime, as such a composition must necessarily be more basic than any known silicate, but believes that Le Chatelier's opinion, that the magma is a ferrite of silica and alumina of indeterminate composition, is much more simple and likely to be correct.

Highest Limit of Lime in Cement

By burning various mixtures of chemically pure materials to the point of incipient fusion, or to a temperature below that of melting platinum (about 1760°C.), Newberry was unable to produce synthetically a satisfactory cement which was more basic than tri-calcic silicate; and to indicate the results obtained at higher temperatures, he cites the experiments made in 1893 by Michaelis, wherein one sample of Portland cement was fused by the oxyhydrogen blow-pipe to a brown glass, composed of 69.42 per cent. lime, 20.78 per cent. silica, 5.83 per cent. alumina and 2.71 per cent. ferric oxide, and which yielded a brown powder of constant volume; while another sample on being fused and analyzed, showed 70.00 per cent. lime, 19.55 per cent. silica, 5.52 per cent. alumina and 2.69 per cent. ferric oxide, but was slightly unsound. The first of these analyses corresponds practically to tri-calcic silicate, according to Le Chatelier's formula, and hence this combination may be regarded as the highest limit for the lime.

Newberry also remarks that in pursuing the chemical and microscopical studies of cements, it will be much better to use products made of pure materials than commercial cements, as the latter always contain more or less impurities which tend to further obscure reactions that are as yet imperfectly understood.

Action of Water on Cement

The question as to whether the hydration of tri-calcic silicate results in the formation of hydrated mono- or di-calcic silicate, along with two or one molecules of crystalline calcium hydrate, is not yet definitely settled, but the preponderance of evidence is in favor of the first-named plan of decomposition. None of the methods adopted for the determination of free lime in hydrated cement appear to be entirely satisfactory, and several able investigators doubt if it can be accomplished by chemical means. According to Le Chatelier and others, the reaction is $3CaO, SiO_2 + Aq. = CaO, SiO_2, 2.5H_2O + 2Ca(HO)_2$, which requires the addition of 35.4 per cent. water, of which 26.2 per cent. enters into chemical combination. On the other hand, it is rarely found that specimens of hardened cement kept in water for several years, exhibit more than 12 per cent. loss of water on ignition, and therefore it would appear that the usual process of induration does not take place in accordance with Le Chatelier's formula.

To test this matter conclusively, Newberry mixed samples of the same cement with different quantities of water, and placed the specimens in distilled water in closed vessels. After periods of 30 days and one year, pieces were broken off, dried at 110° C., ground and the loss by ignition determined. The results were as follows:—

Table No. 1

Designation.	Per Cent. Loss on Ignition after 30 days.	1 year.
Neat cement briquettes, mixed with 15 per cent. water...	8.11	9.10
" " " " " 20 " " " ...	9.54	11.09
" " " " " 25 " " " ...	12.35	13.44
" " pats, " " 25 " " " ...	12.26	15.14
" " " " " 30 " " " ...	13.89	16.87
" " " " " 40 " " " ...	13.45	17.65
Mortar, 1 cement, 3 sand, " " 7.5 " " " ...	13.40	17.24
" " " " " 10 " " " ...	14.49	20.44
50 grams cement added to 300 grams water and kept agitated to destroy cohesion.....	18.94	28.16

From the foregoing table it is seen that the quantity of water which enters into combination with hydrated cement varies considerably and depends on the porosity or density of the mass. It was also found that the completeness of the reaction varies inversely with the tensile strength, the latter diminishing as the quantity of water used in mixing was increased. Furthermore, the last experiment cited in the table indicates that after one year more water (28.16 per cent.) had combined chemically with the cement than is possible according to Le Chatelier's formula (26.2 per cent.). It may also be remarked that a similar experiment was made by Michaelis in 1899, by mixing a very fine cement with 150 per cent. water, and after keeping it four weeks in a sealed tube, the loss on ignition was found to be 27.53 per cent. These experiments show that the determination of the quantity of combined water in hydrated commercial cements throws little light on the reactions of setting and hardening.

Newberry also made a number of experiments with the view of completely dissolving in freshly distilled water, all of the lime contained in the cements which he had made synthetically, as already described. The anhydrous material was pulverized to pass through a No. 200 sieve (40,000 meshes per square inch), and then further ground to extreme fineness in an agate mortar. One gram of powder was then mixed with 750 grams or more of distilled water in a tightly closed vessel, and vigorously agitated to prevent cohesion. The liquid was then allowed to clarify itself by sedimentation, and after different periods of time samples of the clear liquid were tested for the quantity of lime in solution. The sediment was also carefully dried and analyzed, no carbonic acid being found in many cases. The results were as follows:—

TABLE No. 2

DESIGNATION.	Tri-calcic Silicate.	Tri-calcic Silicate.	Tri-calcic Silicate.	Fused Tri-calcic Silicate.	Fused Tri-calcic Silicate.	Tri-calcic Silicate and Di-calcic Aluminate.	Quenched Di-calcic Silicate.	Dusted Di-calcic Silicate.
No. of substance.....	1	2	3	4	5	6	7	8
No. of days in water.....	29	93	32	35	228	39	32	30
Water used per gram.....	750	750	1700	750	750	750	750	750
Per cent. dissolved lime...	33.60	33.35	31.41	22.68	25.20	29.40	6.72	8.30
" " " silica...	0.26	.....	.....	.....	.....	....	.....	....
Sediment contained:—								
Per cent. lime (CaO).....	49.13	47.88	53.48	60.54	57.77	52.60	63.61	62.79
" " silica (SiO_2)....	34.86	35.52	36.44	32.58	33.20	30.60	33.32	34.16
" " water (H_2O)....	15.86	15.98	10.22	6.72	10.00	12.56	2.52	1.08
" " alumina (Al_2O_3) and potash		0.62	.....	0.74	.....	3.60	0.92	1.74
Total	99.85	100.00	100.14	100.58	100.97	99.36	100.37	99.77
No. of equivalents CaO to one of SiO_2.....	1.520	1.454	1.583	2.004	1.875	1.855	2.059	1.993
No. of equivalents H_2O to one of SiO_2.....	1.539	1.510	0.943	0.691	1.000	1.381	0.254	0.109

From the foregoing table and experiments the following facts are deduced. Only a part of the lime is dissolved in the distilled water, and a sediment or residue is left composed of hydrated silica combined with 1.5 to 2.0 equivalents of lime. This confirms Rebuffat's theory that hydrated di-calcic silicate is formed, and upsets Le Chatelier's and Meyer's theory of the formation of mono-calcic silicate. Substances No. 1, 2 and 3 were not fused. The figures for Nos. 1 and 2 indicate that it makes little difference whether the action of the water continues 29 or 93 days, also that the sediment or residue consists approximately of ($3CaO$, $2SiO_2$, $3H_2O$).

In the case of No. 3, it is seen that a great excess of water does not increase either the quantity of lime in solution or the quantity of combined water in the sediment; also that the amount of dissolved lime was here actually less than in Nos. 1 and 2, and that the sediment consists approximately of ($3CaO$, $2SiO_2$, $2H_2O$). This unexpected result will be further investigated, but for the present it may be attributed to the great dilution of the lime, as Rebuffat has shown that more lime is dissolved in lime water than in pure water.

In the case of Nos. 4 and 5, where the tri-calcic silicate had been fused, more lime was in solution and more water entered into combination after 228 than after 35 days, and the sediment consists approximately of ($2CaO$, SiO_2, $0.7H_2O$). In No. 6 a well-burned Portland cement containing about 3.0 per cent. of alumina was used, and its sediment is seen to be similar in composition to that of No. 5. The experiments with di-calcic silicate, Nos. 7 and 8, show that little lime is dissolved and little water enters into combination.

WATER OF CRYSTALLIZATION OR COMBINATION

To determine more exactly the quantity of water which enters into chemical combination with anhydrous tri- and di-calcic silicate, Newberry mixed 5 grams of each substance with 100 grams of water, and agitated the mixtures vigorously during 30 days or more to prevent cohesion. In the case of the tri-calcic silicate, crystals of calcium hydrate began to form on the sides of the vessel after 4 or 5 days, and during the following 14 days their number increased rapidly, after which no further increase was observed. In the case of the di-calcic silicate, no such crystals appeared. The formation of these crystals, which are often seen on briquettes and pats of commercial cement, is evidently due to the same cause that brings about the solution of the lime, since they do not form in water in which free lime has been placed. After the above described treatment, the liquid was allowed to clarify itself by sedimentation, whereupon the clear solution was decanted and tested for lime, while the sediment was carefully dried and analyzed. The results were as follows:—

NEW ARTS BUILDING OF THE UNIVERSITY OF OTTAWA IN COURSE OF ERECTION—CONSTRUCTION: PORTLAND CEMENT CONCRETE, HENNEBIQUE SYSTEM *

* Courtesy, J. S. Irvin, Hope Building, Ottawa, Ont.

TABLE No. 3

Designation.	Tri-calcic Silicate.	Tri-calcic Silicate.	Fused Tri-calcic Silicate.	Fused Tri-calcic Silicate.	Tri-calcic Silicate and di-calcic Aluminate.	Quenched Di-calcic Silicate.	Dusted Di-calcic Silicate.
Number of substance.....	1	2	3	4	5	6	7
No. of days in water.....	31	94	30	258	40	33	34
Per cent. lime dissolved.....	2.51	2.55	2.69	2.63	2.73	1.70	1.37
" " " in crystals....	1.72	....	....	....	....	None	None
Sediment contained:—							
Per cent. lime (CaO).....	59.60	56.14	60.72	60.70	57.20	58.82	62.50
" " silica (SiO_2).....	23.62	22.22	24.30	23.40	21.00	32.60	33.98
" " water (H_2O).....	16.20	21.46	13.29	14.92	18.30	7.78	2.30
" " alumina (Al_2O_3)....	....	....	0.56	....	3.02	....	0.82
Total	99.42	99.82	98.87	99.02	99.52	99.20	99.60
Per cent. water combined....	19.98	27.58	16.35	18.36	23.80	8.92	2.79

The quantity of lime contained in the crystals which formed on the sides of the vessel was determined only in the case of substance No. 1, and it was found that here the lime had combined with $0.55H_2O$; but as the number of crystals appeared to be the same in Nos. 2-5 as in No. 1, this proportion was used in the other cases, and was also applied to the dissolved lime. The total percentages of water that had combined chemically with the dry substances are given in the last row of figures in the preceding table. In Nos. 1-5, the water was saturated with lime, but in Nos. 6 and 7 it was not saturated. The results for Nos. 1 and 2 show that in the case of unfused tri-calcic silicate, more water enters into combination after 94 days than after 31 days; also that such quantity (27.58 per cent.) is much less than the quantity stated by Le Chatelier (35.4 per cent.), but agrees closely with that given by Meyer, who found that in 4 weeks Portland cement combined with 27.26 per cent. water when it was submerged.

The fused tri-calcic silicate combines with much less water than the unfused material, and exhibits little increase in quantity of water if the submergence is continued from 30 days to 258 days. Very little lime was dissolved from the di-calcic silicates, but the quenched material combines with much more water than the unquenched. This circumstance seems to confirm Rebuffat's theory that di-calcic silicate may exist in both an active and an inert state.

Action of a Solution of Sugar on Hydrated Tri-Calcic Silicate

Newberry also made some experiments to determine whether the sediment of hydrated calcic silicate resulting from the mixture of one gram of the anhydrous powder with 750 grams of water had the same composition as that resulting from the mixture of 5 grams with 100 grams of water, as described above. For this purpose samples of the latter sediment of fused tri-calcic silicate (substance No. 3 in the preceding Table No. 3), were placed in 200 cubic centimeters of a 10 per cent. solution of cane sugar. After 29 and 186 days the analyses of the liquid and dried residue were as follows:—

TABLE No. 4

No. of days in sugar solution.....	29	186
Per cent. of lime found in solution.....	24.64	24.10
Sediment or residue contained:—		
Per cent. lime (CaO).....	49.40	42.80
" " silica (SiO_2).....	35.20	31.30
" " water (H_2O).....	15.12	26.50
Totals for sediment.....	99.72	100.60
No. of equivalents (CaO) to 1 of (SiO_2).....	1.513	1.475
" " " (H_2O) " 1 " "	1.608	2.841

A comparison of the results obtained after 29 days with those of Substance No. 4 in Table No. 2, (sediment left after treating one gram of fused tri-calcic silicate with 750 grams of distilled water for 35 days), shows great differences. In the sugar solution the composition of the sediment is approximately ($3CaO$, $2SiO_2$, $3H_2O$), while in the distilled water it is approximately ($2CaO$, SiO_2 $1.5H_2O$). It will also be noticed in Table No. 4, that after 186 days exposure to the action of the sugar solution, no additional quantity of lime appears to have been dissolved, but that the quantity of water entering into combination with the sediment has increased considerably, as the composition is approximately ($3CaO$, $2SiO_2$, $6H_2O$).

Newberry's General Conclusions

In summarizing the results of these experiments, Newberry states that tri-calcic silicate ($3CaO$, SiO_2) is formed by burning at white heat a proportional mixture of very finely pulverized carbonate of lime and silica. This product is free from uncombined lime and silica, has a specific gravity of 3.055, and is sound or of constant volume on hydration. Its hardening properties, however, are imperfect, which result is probably due to its porosity and the large quantity of water required to make it plastic. The fused tri-calcic silicate has a specific gravity of 3.022, rectangular planes of cleavage, and is double refractive. Pulverized and mixed with water, it sets slowly, is sound and hardens as well as the best Portland cement.

Mixtures of carbonate of lime and silica burned at red heat for 2 hours form basic combinations, some of the silica remaining uncombined unless the mixture contains at least 2.5 molecules of lime to one of silica; but if the mixture contains upwards of 2.5 molecules of lime to one of silica, the product will be free from uncombined silica, although it will contain more or less free lime. Burned at white heat, the mono-, di- and tri-calcic silicate mixtures all enter into complete combination.

The quantity of water that will combine chemically with a cement in a given time, depends on the mechanical constitution and porosity of the mass. A dense or compactly moulded briquette will absorb only about 10 per cent. water, but if the same cement is mixed very wet, about 27 per cent. water may enter into chemical combination. The determination of the combined water, however, sheds little light on the nature of the reactions which occur in the process of hardening.

(To be Continued.)

THE METER SYSTEM IN CLEVELAND

Rapid Installation of Meters Desirable—How to Prevent Freezing of Meters—Cost to the Consumer—Effect on Revenues

*By Edward W. Bemis**

No city has ever set so many meters in so short a time as has Cleveland during the past two years. The number in use increased 21,686 during 1902 and 1903, 96 per cent. of which increase was in ⅝-inch meters. There were only 121 of these in use during December, 1901, but in December, 1903, there were 20,850. It was high time two years ago for this attempt to do what should have been done long before. A comparison between Cleveland and Milwaukee illustrates, with remarkable clearness, the results of metering.

Meter System Yields Results

The population of Milwaukee had grown from 177,000 in 1887 to 300,000 in 1901, or 70 per cent, while that of Cleveland had grown with but slightly greater rapidity, having only increased 77 per cent, or from 232,000 to 411,000 in the same fourteen years. The number of connections in use had increased more rapidly in Milwaukee than in Cleveland. In the former city it had grown from 13,243 to 43,386, or 238 per cent, while in Cleveland it had only grown from 22,655 to 55,130, or 142 per cent. The number of meters, however, had increased in Milwaukee eighteen-fold, or from 1,729 to 31,114, while in Cleveland the number had increased only twofold, or from 1,525 to 3,344. Behold the results in pumpage:

The daily pumpage in Milwaukee increased only from 20,000,000 gallons in 1887 to 24,000,000 gallons in 1901, or 20 per cent., while in Cleveland it increased from 22,000,000 to 69,000,000 gallons, or 213 per cent. in the same period. The daily consumption per capita declined in Milwaukee from 113 gallons in 1887 to 80 gallons in 1901, but in Cleveland it rose from 96 gallons to 169 gallons in the same time. In other words, the consumption of water in Cleveland, which was nearly one-third less per day per capita in 1887, was over twice as much in 1901 as in Milwaukee.

Rapid Installation of Meters

On assuming the superintendency of the Water Department in September, 1901, the writer of this paper began, with the able co-operation of Mayor Johnson, a campaign of universal metering. In January of the present year 25,030 meters were in use on 42.5 per cent. of the 58,852 services. The average daily consumption in 1903 was 62,010,650 gallons, or 7.5 per cent. less than in 1901. It was 142 gallons per capita instead of 169 gallons. If the remainder of the city is metered and a careful examination is made of the possible leakage in street mains, the consumption ought to be reduced to 100 gallons. It cannot be made so low as in many cities because of there being no source of water supply except to a few factories, aside from the City Water Works, and because about 40 gallons per day per capita are used for business purposes and in large hotels.

* Superintendent Water Works, Cleveland. Ohio.

The average increase of water used every three years from 1882 to 1900 had been 32.9 per cent., and during the three years ending in 1900 it had been 38.7 per cent. Since the city was growing rapidly and was very prosperous during the following three years, it is reasonable to suppose that the consumption, without house meters, would have increased another 32.9 per cent., and would have averaged about 80,000,000 gallons per day last year, or 37,000,000 gallons—i. e., 43 per cent. more than was actually pumped. The pumpage the first four months of the current year has been slightly less than for the corresponding period of 1900, while the average increase for the four years in this city since 1880 has been 46 per cent., and during the period 1896 to 1900 it was 47 per cent. This does not take into account the slip of the pumps, which has been carefully measured by Mr. Cole with his pitometer, although only approximate results can be reached. It appears, however, that owing to the use of newer and more improved pumps the slip in 1900 was about 10 per cent. and in 1903 about 5 per cent.

Methods to Popularize Use of Meters

In order to popularize the meters they were set impartially on every street radiating from certain centers selected as representative of different classes of the population. It was thus possible for the more prudent housekeepers to realize the advantage of the meter, and to create public sentiment that should meet the opposition of the more wasteful. Neither the flat nor the meter rates, however, were changed. The flat rate is $3 for the first three rooms or less, and 50 cents for each additional room, together with $2 for every bath tub and every water closet. On all flat rate bills of $1.50 for six months there is a discount of 15 per cent. Nothing is charged for lawns unless where there is over 66 feet frontage. Thus an eight-room house with one bath and closet would be charged $9.50 per year. The meter rate is 5 1-3 cents per thousand gallons, or 40 cents per thousand feet for all consumers, large or small.

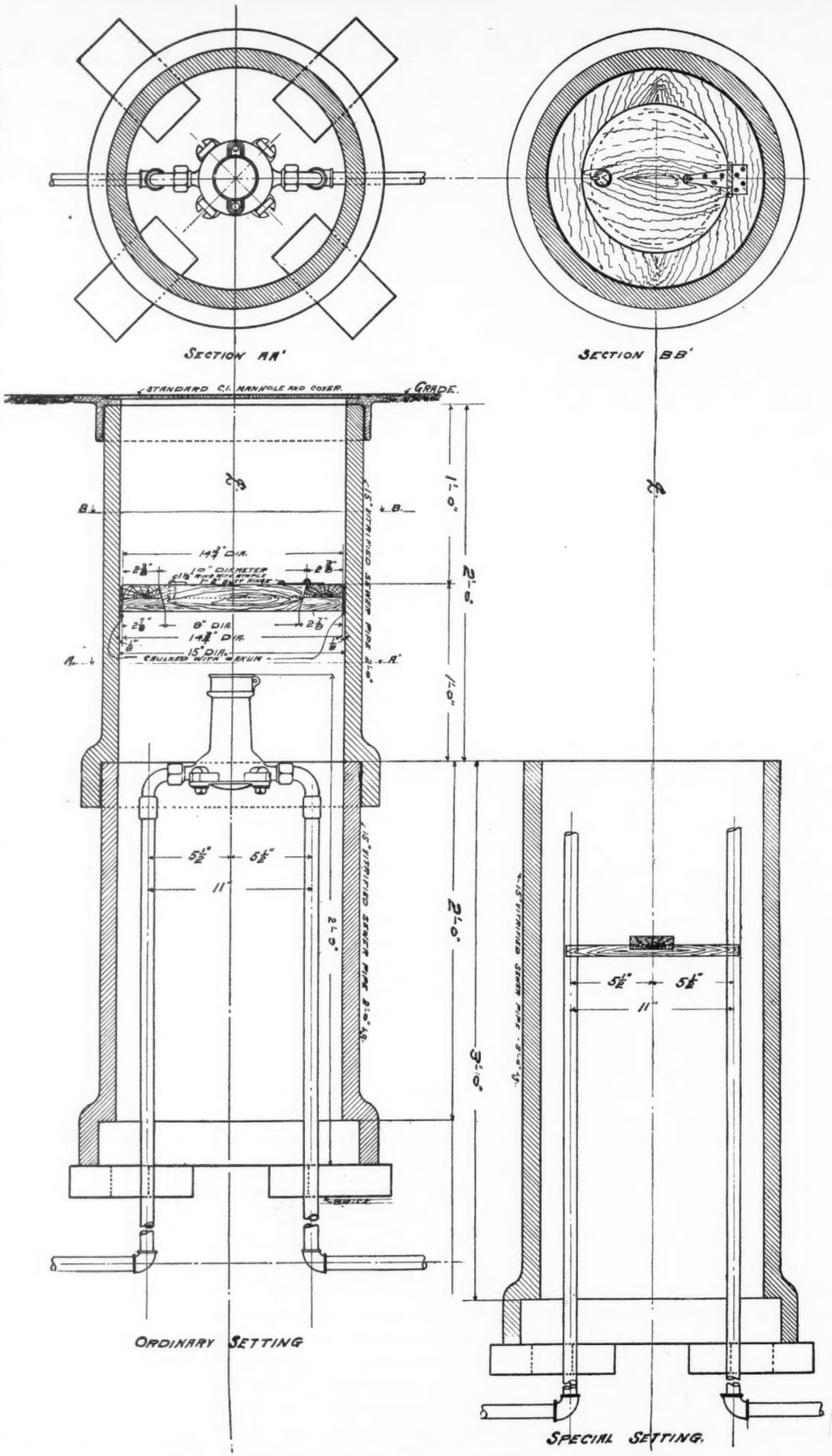
Of the thirty-eight cities of the United States of over 100,000 population, only two, Detroit and Washington, charge less on the meter basis than do we for ordinary house consumers, and both of these cities pay a considerable revenue to the Water Departments for water used for city purposes, while the Cleveland Water Department does not receive a cent, although it furnishes a large amount free for public use. Five other cities of the 38, viz., Chicago, Toledo, Detroit, Indianapolis and Buffalo, have a lower rate for large consumers. But the scale is so adjusted that in most of these places any Cleveland firm would pay higher rates than it now does with us. In the two most marked exceptions, Detroit and Buffalo, the city pays the water department a large sum annually for water used, which is also true in the case of Indianapolis.

Cause of Objections to Meters

Until last November few objections were heard to the rapid increase of meters in Cleveland. Three causes have since somewhat changed this condition:

1. Some political conditions not at all connected with meters, but which have led to an opposition in the Council to administration measures.

2. An epidemic of typhoid fever, due in very large part to the lake water, visited the city in the early part of this winter. As this was unfortunately coincident with the discussion of the meter question, the amusing idea arose, and was for a short time widely held, that the meters were the cause of the typhoid. Fortunately the introduction in March of a new water supply through a tunnel running four miles out into the lake has already almost entirely stopped the typhoid and the scare connected therewith, but those desirous of prejudicing the people against the meters have introduced the matter of health in a new form by claiming that the screen embedded in our meter, the Trident, collects organic sediment and especially small fish and allows them to putrify and injure the water. Investigation has shown that no animal matter is to be found on these screens, except that on less than one meter out of a hundred a small fish may lodge in the course of a year. Usually, however, this lessens the flow of water, and the Water Department is notified and removes the fish. To avoid this difficulty in the future, screens are being placed at the outlets of the tunnel and of the reservoirs with a



GENERAL PLAN OF ORDINARY AND SPECIAL SETTING OF WATER METERS AS PRACTICED BY THE CLEVELAND WATER WORKS DEPARTMENT

⅛-inch mesh, which will probably prevent all such trouble hereafter. The experience of other cities is solicited as to how fine a mesh it is practicable to use.

It is well known among Water Works Superintendents that there is scarcely a committee of experts that has ever reported on water purification that has not suggested meters in order to lessen the cost of a purer supply. It is obvious that this would not be done if these experts, from Maine to California, had any evidence of the unsanitary character of meters.

Freezing of Meters

A third cause of objection to meters this year has been the freezing of many meters and metered services. This condition has not been peculiar to Cleveland. From water works superintendents all over the North have come reports of similar conditions. The Weather Bureau records show this to have been the coldest winter since the establishment of the Signal Service. The effect of this on the Water Department was greatly aggravated by the almost entire absence of snow since the thaw in January, which left the ground exposed to the cold. During the last few years our tappers have been instructed to refuse to tap the street mains for new services until the trench from the main to the curb was 5½ feet deep, but a large proportion of the old services of the city were originally laid only four feet deep, or have become only that deep on account of the grading down of the street along the line of the service pipes. No special trouble, however, had occurred from freezing prior to the past winter, when the frost on some streets went down from 5 to 7 feet. Four causes then contributed to the large amount of trouble, as follows:

a. The condition of temperature and snow, above referred to.

b. The shallow service pipe setting, also referred to above, which not only existed in the streets, but also inside the premises of the owner.

c. The knowledge of a meter being in place led many families to refrain from letting the water run night and day to prevent freezing, as had been customary where the danger from freezing was thought to be great. Our water rates are so low, being only one cent for 200 gallons, that I announced through the papers that one could permit one quart a minute to run constantly at an expense of only two cents a day, or $1 for the fifty days when the most of the freezing occurred, during January and February. Many misunderstood this, and allowed a large stream to run, and are now claiming that they should not be charged for it, as they did it by what they thought was the authority of the Department. Many others, however, did not let their water run constantly, and their service pipes were so poor that they froze in the unusual winter weather.

Manner of Setting Meters

d. The meters themselves, in many cases, were not set properly in the sewer pipe setting, which was briefly explained to the American Water Works Association last year. The accompanying cut shows the ordinary setting as it was last year, save in the matter of the wooden cover, while the other drawing, marked "special setting," illustrates the extra foot of sewer pipe that we are now placing in more exposed locations. The meter hitherto, when placed outside and not in brick vaults, was enclosed in four feet of sewer pipe 15 inches in diameter on the inside. Risers came up from the service pipe to the meter, the top of which was only 18 inches from the iron cover. Resting on the top of the meter was a loose wooden cover. Within the entire four feet of sewer pipe there is no earth, but merely an air chamber.

With 979 settings in such sewer pipe in the winter of 1902-3 not one froze, but during the past winter 1,226 out of 10,423 set in sewer pipe, or 11.7 per cent. froze, as compared with 136 out of 4,483, or 3 per cent. set in brick vaults and 165 out of 9,727, or 1.7 per cent., set in basements. To be sure, this is not a fair comparison, at least as between sewer pipe and basement settings, since meters were only set in basements where the latter were in good condition and gave promise of being free from frost, in the older sections of the city where the service pipes were near the surface the sewer pipe settings were almost universal.

Unmetered services also froze in large numbers in the same sections of the city in which the metered services froze in largest numbers. Still, after all allowances are made, we believe that there were two defects in the sewer pipe setting which are now being remedied as fast as possible, as indicated in the accompanying cuts, as follows:

First, the wooden meter cover did not fit tightly enough; indeed, it often became tilted as it rested loosely upon the meter. We are now substituting throughout the city a wooden rim (diagram) tightly caulked by oakum against the sewer pipe (A), attached to the rim, which is about one inch thick, is a larger hinge, which is also attached to an inner wooden cover that comes down to the opening of the wooden rim on a bevel, and fits so tightly as to give promise to being almost air tight. This wood is being subjected to a chemical treatment that will preserve the wood. This wooden cover is only one foot below the iron cover, and cannot be left up against the sewer pipe or the iron cover, so that the meter reader will be obliged to put the wooden cover in proper position before leaving the premises. In some sections of the city where there is most danger of freezing an extra foot of sewer pipe is to be placed underneath the four feet that we now have, and a cross brace of wood is to be used partway down the riser to keep everything in place, as illustrated in the cuts.

The experience of other cities in the use of outside settings will be very helpful to us in Cleveland, and it is to be hoped that the discussion following this paper will bring out this information.

Of our meters and metered services 60 per cent. more froze on the south side than on the north side of the streets running east and west, as was to be expected, but about the same number on each side of the streets running north and south. Of 2,904 services that froze—although in about one-half of the cases the meters did not freeze—40 per cent. were on the south side of the streets, 25 per cent. on the north side, 18 per cent. on the east side and 17 per cent. on the west side.

Thawing Out Frozen Meters by Electricity

The thawing of services was mostly done by four electrical machines. Three of them obtained their current from the street railways at a cost of 6 cents per kilowatt, or $39.18 for the 434½ hours in which current was actually used. This current was of 300 amperes and 5 volts, or a total of 1.5 kilowats per hour. In cases where the wires, nearly 1,000 feet long, could not reach from the trolley to the meter we used a steam machine to furnish power to the dynamos. This machine of 12 H. P. had just been purchased for other uses of the Water Department, and was easily transported on wheels. The total cost to the Department of repairing meters and thawing out the services has been $11,520, or about 46 cents per meter, if distributed equally over the 25,000 meters in place. Of this sum about $3,500 has been required for inspection, taking out frozen meters, or those where only the service was frozen, repairing the meters either in place or at the shop, and resetting them. The machines thawed out 1,164 metered services and 349 unmetered, or a total of 1,513, at a cost of about $7,700, or about $5 per service. Private plumbers thawed out a few metered services, and many more unmetered ones.

Cost of Setting Meters

The following table will give the cost of labor and material in the three kinds of settings in 1903, and the estimated cost of the improved sewer pipe setting in 1904. The labor cost is high in basement settings, because the basement meters are widely scattered. In brick vaults the labor cost is low per meter because in such vaults two or more small meters are sometimes set in one vault. This table refers only to ⅝-inch meters:

Cost of Basement Settings

Brick	.12
Cement	.05
Cover	.30
Fittings	.25
Total material	$0.72
Labor	3.23
Total	$3.95

Brick Vaults

350 brick	$2.45
1½ sacks cement	.38
2 couplings	.08
2 ells	.12
1 nipple	.06
1 union	.24
1 ring and cover	3.21
Total material	$6.54
Labor	2.92
Total	$9.46

Sewer Pipe Settings

	1903.	Estimated cost 1904.
Sewer pipe	$1.46	$1.84
Frost cover	.18	.47
Cross brace	.00	.04
Ring and cover	1.42	1.42
2 ells	.12	.12
2 couplings	.08	.08
7 feet of ¾-inch pipe	.35	.35
Total material	$3.61	$4.32
Labor	4.01	4.51
Total	$7.62	$8.83

The average cost of setting 13,407 ⅝-inch meters set in 1903 was $6.87, and the meter itself, with connections, cost $6.50, or a total of $13.37. During that year 857 ⅝-inch meters were set in brick vaults, 3,174 in basements and 9,378 in sewer pipe.

Cost of Operation

The cost of operation of the meter department is greater in this period of rapid setting and growth than it will be later. Nearly all the expenses of investigation of where to set new meters, and the clerical work connected with the setting, changes in the form of setting and experiments connected therewith are charged to operation. Many more meter readers are now employed in proportion to the number of meters in place than will be needed later. It has thus far been customary to employ one meter reader for every 1,000 meters in place, and to have these men not only read the meters every six weeks from March 1 to December 1, but also to investigate all causes of waste and to notify the property owners and tenants of the same and direct them how to lessen the waste. It is also customary at every meter reading for a laborer to accompany the meter reader and to turn off the water in any house which is apparently wasting water, while the meter reader waits at the meter to detect any running water. We have hitherto bought none but Trident meters, of which we secured 10,000 ⅝-inch, 800 ¾-inch and 200 inch meters previous to last year, and 15,000 ⅝-inch last year. In each case this company was the lowest bidder, and we have found the meters very satisfactory, but have thought it well to frequently test them, to make sure that they were running all right. As time goes on it will not be necessary to do this so often, or to read the meters so frequently.

Last year the meter reading and clerical work connected therewith amounted to $1.10 for each of the average number of meters in use during that year, while the repairs were 10 cents. Interest and depreciation at 8 per cent. would be $1.07, or a total of $2.27.

On these small meters the increase in cost is more than counterbalanced by the difference between the pumpage expenses and what they would have if the pumpage had increased as rapidly the past three years as it had been doing previous to the introduction of meters on a large scale. There remains from meters the large saving in the fact that the city has not been obliged to put in new pumps,

buildings for the same and large mains, which otherwise would have been necessary. Even if contracts for these had been let two years ago, they would not have been ready to enable the city to be supplied this spring with pure water from our new intake and therefore the typhoid fever epidemic would doubtless still have been at its height.

Results to the Consumer

It is too early in the history of the domestic meters in Cleveland to determine the results to the consumer. At the semi-annual collection last October only 8 per cent. of the entire number of houses metered paid more than under the assessment rate. Two-thirds of 1 per cent. paid the same, and the other 92 per cent. paid less. Twenty-four streets were selected with a good class of houses where nearly every home had been metered for over a year. On these streets having an average annual assessment of $11.83, the 825 families were paying under our system of minimum charges $7.36, or 62 per cent. of their old assessment rate, and they were using only $3.95 worth of water per year, or 33 per cent. of their old rate; that is, they were using on the average only 9,875 feet per family per year, or 202 gallons per day. On a class of houses considerably poorer on eight streets were 172 residences, the average assessment rate being $7.64 per year, and the payments under the present minimums are $5.38, or 70 per cent. of this, and they are using on the average only $2.61 worth of water, or 6,525 feet per year. This is equivalent to only 134 gallons per day per family.

Finally the 648 metered places on 23 still poorer streets have been investigated for the year ending April 1st. Their annual assessment averaged only $6.14. They are now paying $4.66, or 76 per cent. of the above, and are using an average of only $2.32 per year, or 5,800 feet. This is equivalent to only 120 gallons per day per family, or probably only 25 to 30 gallons per capita. The better class of houses would only pay 33 per cent. of the assessment rates if there were no minimum, the next poorer class of houses would pay 34 per cent., and the still poorer class would pay 38 per cent.

Use by Schools

The use of water in the parochial schools, both Lutheran and Catholic, has been ascertained, for they have been paying meter rates metered. It is proposed henceforth to allow free to those and to the public schools some limited amount of water per pupil per day of school attendance, and charge both public and private schools all in excess of this amount. During the approximately 144 days of actual sessions of the schools during the six months ending April 1, 1,753 pupils in average attendance on the five Lutheran schools used 3.5 gallons per day per pupil. Similarly the 14,130 children in average attendance in the thirty-four Catholic schools used 3.9 gallons. In each case, however, there were buildings where over three times this average amount was used, even though metered. In fact, there was one building that used eight times this average, while many others used far less than the above average of under four gallons per day.

Minimum Rates

The minimums that were adopted with the beginning of universal metering in 1902 were as follows:

Five dollars semi-annually for all meters larger than ⅝-inch, unless meters had been put in by the consumer when the minimum was $4. In the case of the ⅝-inch meters there are four minimum rates; $1.25 every six months for all semi-annual assessment rates of $2 or less; $2 for those whose assessment rates are $3 or less; $3 for those whose assessment rates are $5 or less, and $4 for all others. There were two reasons for these minimum rates; one to prevent too great a reduction in revenue in a city which gives the small consumer the same low rates as are paid by the United States Steel Company with its water bill of $30,000 a year; the other reason was to meet the objection of those who feared that without a minimum people would economize unduly in the use of water. Even the lowest minimum at our rates allows the use of 130 gallons per day, or sufficient to flush a water closet 20 times a day, to flush 200 feet of ¾-inch pipe from the street main to the kitchen three times, and to allow 56 pint glasses per day for drinking, and 42 gallons for cleaning.

The time, however, has now arrived where the financial condition of the department permits the abolition of all the minimums, except the lowest of $1.25 every six months, which should be retained to insure a healthful use of water, and because it costs fully that amount to take care of the meter and to provide for interest and depreciation on it, even if not a drop of water goes through it.

An ordinance is now pending in the City Council to abolish all other minimums on the ⅝-inch meter.

Effect on Revenues

Thanks to the growth of the city in business and population the reduction in charges to the residences that have received meters has been somewhat more than counterbalanced by the increased consumption of water by large business places and by the increased population. During the six months ending with September 30, 1900, the collections were $371,000. During the corresponding period this year they will be about $420,000, but if all the minimums, except the lowest, are swept away, which would take effect with the October bills, the revenue during next winter will probably be about the same as four years before, while the majority of household consumers will pay only one-third as much as formerly.

The wages and salaries in the Meter Department are as follows:

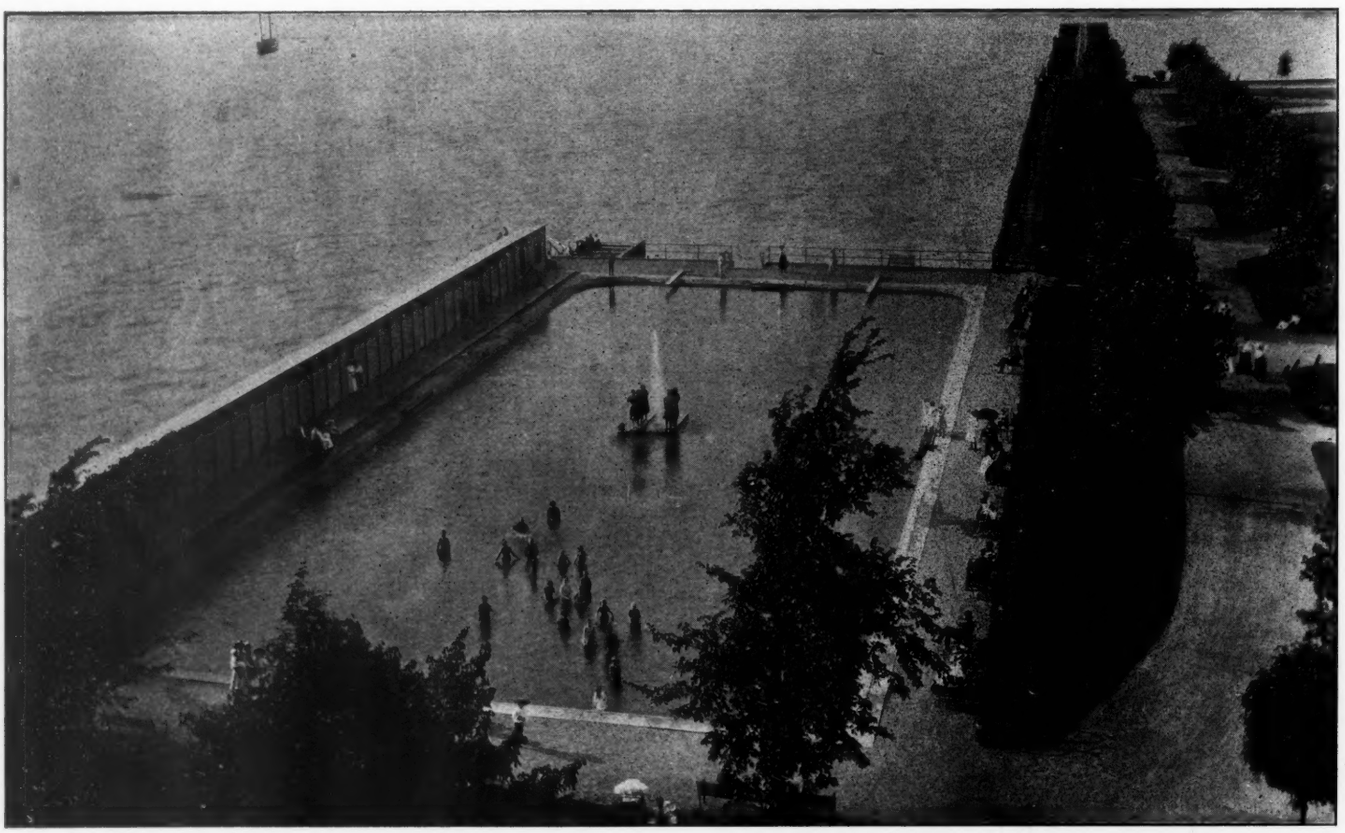
A chief at	$2,000.00
A bookkeeper at	1,100.00
A few clerks at	$660.00 to 900.00
Foreman and inspectors at 30 to 42 cents per hour.	
Meter readers at	$2.25 per day.
Installers at	2.20 per day.
Laborers at	1.68 per day.

Eight hours constitutes a day's labor.

Conclusion

Despite the difficulties of the past winter the meter system is very popular with the mass of the people. During

the first half of May preceding the time when this paper is sent to the printers the requests for meters have averaged more than ten a day, Sundays included. Meters are set and cared for entirely at the expense of the Water Department. The early opposition of the plumbers to this work of direct city labor has practically disappeared. The Department is just undertaking a systematic lowering of all services throughout the city where they are not 5½ feet below the surface and located on streets where there is special danger of freezing. A few street mains are being lowered also, although none of them froze last winter. The press of the city is friendly, and the Mayor and Board of Public Service are very enthusiastic for the metering of every connection. It is probable that this year every connection larger than ⅝-inch and half of all the others will be metered. Only 465 services larger than ⅝-inch, including free connections, but not free lines, are still unmetered, and the Council has just authorized the purchase of $12,000 worth of large meters with which all of these services will be metered this year. If support is received from the Council all the remaining services will be metered within three years. What has been done already, however, renders it certain that even if the pace hereafter is slower, the time is not far distant when universal metering will be accomplished in this city of 450,000 inhabitants, which already has more meters than any other city in the United States, excepting New York and Milwaukee, and more meters on domestic consumers, probably, than even New York, although still a little behind Milwaukee in this respect.



Courtesy Commissioners of Water Works, Erie, Pa.

SWIMMING POOL AT THE PUMPING STATION OF THE ERIE WATER WORKS

BUILDING REGULATIONS IN INDIANAPOLIS

Long Needed Changes in Building Construction and Inspection Department—A Good Example for Other Cities to Follow

THE most voluminous ordinance ever passed by the City Council of Indianapolis is the measure providing for the construction of buildings and appurtenances thereof, which has just been made effective by the affixing of Mayor Holtzman's signature. It is more than a general building ordinance. It has special provisions for fire protection in theaters and public places of amusement, regulations to abate the smoke nuisance and directions to enforce sanitary plumbing.

George W. Stanley, building inspector, is the father of this ordinance. It was drawn under the direction of the City Council by a commission consisting of the building inspector, C. E. Coots, fire chief; Henry Warrum, city attorney; J. H. Billingsley, president of City Council; O. D. Bohlen, Louis Gibson and P. C. Rubush, representing the architects; W. P. Jungclaus and C. C. Pierson, of the allied building trades; as well as a number of other professional and laymen. They spent three months in the preparation of the ordinance and it passed with but few minor amendments. As it stands completed, the ordinance consists of 304 sections, covering seventy-five closely printed pages.

Embodied in this measure are the most up-to-date features to be found in the building laws of the leading cities in the United States, so far as they apply to the city of Indianapolis. The building department is taken out of politics and the appointment of the inspector and his assistants is in the hands of the Department of Public Safety, which names a Board of Examiners whose duty it is to examine applicants for positions in the theory and practice of architectural construction, calculation of strength of materials, strength of truss work, stability of arches and other questions bearing upon general building work. The Board of Public Safety must choose the employees for the building department from among those who took the examination. City Council fixes the salaries.

One of the most decided changes, so far as Indianapolis is concerned, relates to the manner of charging for building permits. For all buildings, hollow sidewalks, additions and underpinnings, the permit fee shall be one cent for every one hundred cubic feet of the contents of such building. The cubic contents are to be measured to include every part of the building from the basement to the highest part of the roof. Heretofore, the charge for permits has been 25 cents for every $500 value of the building. It is claimed that the city was frequently deprived of revenue to which it was entitled, because the cost of improvements was misrepresented. It is believed that the new scheme lessens the possibility of fraud in paying for permits and will increase the city's revenue from this source. Fees for moving permits will be figured at the same rate. Where it is impossible to employ the cubic basis, as in interior alterations, the fee is to be 50 cents for every $500 that the improvement costs.

The building inspector is given jurisdiction over all fences, signs and bill boards in the city. Application for the erection of advertising matter of this kind must be made to the inspector and before issuing a permit, plans and specifications must be submitted to him. They must be approved by the chief fire engineer, so as not to interfere with fire fighting. No sign shall be erected which in any way endangers public safety or conflicts with public convenience. All signs and bill boards must be made of non-inflammable material. Sign boards already in use conflicting with these provisions must be removed within six months. Signs shall not be permitted to extend beyond the property line.

In an explicit section, the construction and arrangements of buildings intended for theaters and amusement halls, are dealt with. The drawing of this ordinance began shortly after the Iroquois theater horror in Chicago and sentiment growing out of that catastrophe had some influence in the framing of this section. The mayor is given authority to close any amusement building that may be regarded as dangerous and to keep it closed until pronounced safe by the building inspector. The entrance to all parts of theaters where persons are seated, must be from the street front. Twenty inches of exit space are required for each 100 seating capacity. All doors must open outward and bolts must be kept withdrawn and exits unlocked. Incombustible walls must separate dressing rooms, work shops and property rooms from other parts of theater buildings. The stage and auditorium are to be separated by a fire wall extending four feet above the highest part of the roof. Floors must be fireproof and all woodwork on the stage is to be fire-proofed. Only metal or asbestos curtains can be used on the stage.

Standpipes are to be maintained in the theater proper and a sprinkler system with fusible plugs on the stage and under it. The water supply shall be two-fold, the city pressure and automatic pump or tank in the theater. This equipment must meet the approval of the fire chief. Explicit regulations cover all electric wiring and it must be of the most approved type and must be thoroughly inspected before being concealed. No rubbish may be permitted to accumulate in any part of the theater.

In the fire limits which embrace the heart of the city and that district where big buildings prevail, all buildings must be of fire-proof construction. The ordinance specifies that all schools, hospitals, hotels, lodging houses, public halls, flats, apartment houses and office buildings of more than three stories in any part of the city, must be fire-proof. All loads must be carried on brick, stone, tile or metal. Slow burning and mill construction are provided for. Fire escapes must be put on all buildings of more than two stories, in accordance with the State factory law. All lodging houses must keep a watchman at night time and the halls must be well lighted at all times, red light indicating the direction to exits. Fire gongs are to be placed in corridors and alarm bells in each bed room.

MUNICIPAL JOURNAL AND ENGINEER

Published Monthly by

THE MUNICIPAL JOURNAL PUBLISHING COMPANY

253 Broadway, New York

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TERMS OF SUBSCRIPTION

(Payable in Advance)

United States and Canada	$3.00 per year
Foreign Countries	3.00 "
Single Copies, each	.25

Special rates given for clubs of ten or more.

Make all checks payable to The Municipal Journal Publishing Company

Entered at the New York Post Office as second-class matter

NEW YORK, JULY, 1904

The Asphalt Situation in Cincinnati

To repair or resurface the worn-out asphalt pavements; to have open or closed specifications, as touching the brand of asphalt used, are the questions now agitating the city officials of Cincinnati. Ever since last March the newspapers have been printing columns of matter in support of Mayor Fleischmann's policy to bring about a better condition of the streets. When it is known that of the 400 miles of paved streets less than one-tenth is paved with asphalt it will be a cause of wonderment that any worry is necessary. If it were brick, bitulithic, treated wooden block, or stone pavements, there would be no cause for worriment about repairs, as it only costs cents to keep any of these pavements in repair where it costs dollars to maintain a poorly laid asphalt pavement or one laid with Trinidad Lake asphalt. As is now well known, New York and Washington have prohibited the use of Trinidad Lake asphalt in the construction of any of their asphalt pavements, because it has been demonstrated by Prof. A. W. Dow, Government inspector of asphalts, and by others, that Trinidad Lake asphalt is the most inferior grade of asphalt in the market. As near as we can ascertain, when all things are considered, it costs more to keep the less than forty miles of asphalt pavement in Cincinnati in good repair than it does to maintain the 360 miles of other kinds of pavement. Cincinnati should congratulate herself that she has not a larger amount of Trinidad Lake asphalt.

As to open specifications, Mayor Fleischmann is right when he says:

"This is not a matter that concerns merely one or a dozen companies, this or that asphalt as it is known by name, but whether the paving specifications of the city are to be opened for competition. All that has to be provided for is that the asphalt to be used shall be up to a required standard of purity."

It is wholly practicable to determine the quality of any brand of asphalt by analysis; indeed, it has already been done and is being practiced by many cities, and it only remains for Cincinnati to fix upon a standard of purity and then see that it is maintained. We have none but the city's welfare at heart when we urge every municipality to follow the example of New York, Washington and other cities in this regard. When this is achieved then let the city officials of Cincinnati see that honest work is performed by the contractor and much better asphalt pavements will result.

For several months Mayor Fleischmann has been strenuous in his efforts to have the few miles of Cincinnati's asphalt streets put in good condition at a reasonable cost. But at every turn he has met opposition from the Trust, which has the city in its power in that only a certain brand—its own—of asphalt can be used according to the specifications. At the present writing it looks as though the Mayor would win out in his effort to have the Council pass an ordinance permitting the revision of the specifications and so permitting open competition, at the same time freeing the city from the clutches of the Trust. In a recent interview in the Cincinnati *Enquirer*, Mayor Fleischmann said upon this point:

"Unless we can get satisfactory work at reasonable prices from the people who control the asphalt now in use here it is high time we make a change. We should either stop paving the streets with asphalt entirely and use some other material or change our street paving specifications so as to accept land asphalt as well as lake. In fact, I think Council should provide in its appropriations for next year for a fund of about $100,000 for the purchase of a municipal asphalt street repair plant. It appears to have come to the point that the municipality must ask some one else before a street can be repaired, and the contractors do the work in their own way and at their own time.

"I will not consent to be throttled in this manner. This thing is getting worse every minute." In a subsequent interview he said:

"I shall also advocate giving the bitulithic pavement a trial in this city. Many other cities have adopted it as a pavement, and I have been informed that St. Louis and other large municipalities are very well pleased with it."

Mayor Fleischmann, in our estimation, should go one step further and have open specifications for all kinds of pavements. He should make, also, as great an effort to rid the city of its sixty-nine miles of cobblestone pavement and of a large per cent. of its macadam, much of the latter being in a bad condition. We believe that he should advocate the use of smooth pavements, like brick, treated wood and bitulithic. These smooth pavements should be used many times where granite block is used and to the greater comfort of both man and beast.

"The Street Paving Problem in Chicago"

AMONG the larger cities there is no city so badly paved as Chicago. For instance, it has about 1,400 miles of paved streets, as compared with 2,800 miles of unpaved streets. Among the larger cities New York has only 700 miles of unpaved streets and Philadelphia 400 miles. It is an encouraging sign of the times to note that the "Windy City" is now strenuously agitating the question of better pavements. What is most commendable is the way in which the subject is taken up. For all that New York and Philadelphia frequently throw stones at Chicago and her manner of doing things. These eastern cities could follow her example with much profit, and if they did there would be some hope for lasting improvement in their respective bailwicks, in the correction of some of their evil conditions. Chicago recognizes the actual bad condition of its streets and takes up the subject for their improvement in the right way by appointing a committee of intelligent men, who in turn select a thorough-going engineer to investigate the whole subject and report upon a course of action that will not only put the present pavements in the best state of repair, but create a fund without burdening the taxpayers that will enable the city to systematically improve the wretched condition of its thoroughfares. New York is spending eleven and twelve million dollars annually for the laying of new pavements and the maintenance of old ones, and Philadelphia is not far behind in the aggregate amount expended, and yet the work is not half as intelligently done as is proposed in the plan for better things in Chicago.

A large amount of space is given up in this issue to the report of the consulting engineer, Mr. John W. Alvord, employed by the Chicago Commercial Club to investigate and report upon the conditions of the pavements in Chicago with recommendations for their improvement. Mr. Alvord's pertinent suggestions in regard to the needs of Chicago may well be applied to almost any American city, large or small. He sums up the local situation in regard to the problem of maintenance and future improvements as follows:

"We are all more or less familiar with the inadequate revenues which the city of Chicago has to clean, maintain and repair its streets, and a great deal has been said upon this subject of recent years. Any general fund for cleaning and repairs in Chicago, however adequate, is a delusion, because no general fund in so large a city is ever satisfactorily administered. There is needed specific territorial appropriation, local interest and a local sense of responsibility in the expenditure, and a certain thoughtful care in detail, to properly use moneys for such purpose. A general fund administered from a central authority commonly has none of these features.

"What is needed therefore is: First, proper and adequate amount of funds for the purpose of cleaning and repair, and it may be suggested, for the purposes of discussion only, that rather than amend the laws so as to provide for larger general funds, that the special assessment laws could be amended so that local taxation could provide for the cleaning, sprinkling and repair of the streets, including the maintenance of the parkways, care of the trees and sidewalks.

"Such an idea may prove to be objectionable and illegal. It is mentioned here only suggestively, but it would seem to have some obvious advantages.

"Such special assessments might be incorporated into the original ordinance for the street improvement, so that when the question had once been taken up in any given locality, the annual cost of maintenance in a clean, orderly condition, would be settled for a term of years at the time its original cost was provided for. A certain amount of local interest would be thus assured on the part of the local taxpayer.

"It should be noted in this connection that the planting of trees and sodding of parkways is just as much a part of the improvement of streets as curbing and grading the roadway, and might always with profit be included in the same ordinance.

"Second, if the above suggestion is illegal or impracticable, and the funds for cleaning and repair must be provided for in a general way, some systematic method must be adopted for their proper distribution and thoughtful expenditure.

"Here, again, the methods of the French appear to be the best that can be devised, and it would seem that the appropriation for this purpose ought to be authoritatively distributed by the proper legislative body to the different thoroughfares or districts in proportion to their importance as indicated by the amount of travel or character of improvement.

"Once so distributed, the object ought to be to secure a certain amount of local interest among the taxpayers as to the careful and proper expenditure of the maintenance fund.

"The local superintendent or road man might be appointed by the central authority upon the advice and consent of an association of taxpayers of the thoroughfare or district, who should be made responsible parties to the expenditure.

"In such case there would be the personal interest of the local committee, which ought to insure thoughtful work and care in the expenditure of the fund.

"The real basis would then become the spirit which now inspires the local improvement associations in their work, that is to say, a local pride and responsibility.

"Under present conditions we see magnificent improvements made at a large first cost neglected from the day of their completion. Manholes protrude above the pavement, crosswalks become elevated so as to cause great annoyance to teams, curbs settle out of place, holes begin to appear and the street assumes generally a shabby and neglected look within a year or two after it is finished.

"It is well understood that certain classes of improvements to streets in Chicago are made unusually heavy and proportionally expensive because it is expected that they will receive almost no care from the time of completion until taxpayers are driven to petition for a new pavement. This results in the injudicious use of public money, but it is still more unfortunate that it lowers the public ideal of what a street ought to be, and makes Chicago citizens apparently content with what impresses the visitor as unkempt, shabby and neglected roadways.

"The city of Chicago has already spent many millions of dollars wastefully upon its public streets. It has already spent enough money to be a well-paved city, but it has spent

that money uneconomically and without careful study or proper advice.

"There are accomplished, intelligent and educated engineers in the City Hall who understand paving problems, but their assistance is not often sought. Their time is filled with innumerable petty details, and the taxpayer has for years insisted upon his right to decide the kind and cost of paving of his street as a local and neighborhood question, and has resisted the attempts of any city administration to force upon him anything like a general policy with reference to the paving question of the city as a whole.

"Chicago stands at the parting of the ways. She is facing the expenditure of fully $16,000,000 to repair the mistakes of the past. Will she now stop and consider, and perhaps employ competent, expert advice as to how it should be expended, and will she believe that any thoughtful policy of a broad and general nature is a wise guide for the future?

"The Board of Local Improvements ought to have, as their adviser, the best consulting expert on street improvements that can be found in the United States. Such a man ought to study the Chicago problem broadly, attentively and thoughtfully, in the light of all the best European and American experience. He should secure advice of the best experts that can be found the world over on special problems, and should view the subject in its broadest economic and social requirements. The Board of Local Improvements, thus advised, should arrange a general policy of improvement, outline methods and classify the streets, designating the kind of improvement to go with each class, recommending such legislation as will enable adequate maintenance to accompany all construction, and see to it that some system is devised by which such maintenance shall be skilfully, thoughtfully and persistently carried out."

They Defy Receiver Tatnall

THE directors of the defunct Asphalt Company of America have defied Receiver Tatnall's authority. They were summoned to appear before him on June 17 and give information concerning the organization and management of the company, but none of them appeared.

The purpose of the proposed investigation was to enable the receiver to secure information about the company to aid him in the suits brought in the New Jersey courts to compel an accounting of the various moneys received by the corporation. By failing to appear and testify it is evident that the men intend to contest Receiver Tatnall's authority to compel them to furnish the information that he is desirous of obtaining.

The investigation was authorized by the provisions of an act of 1875, New Jersey State laws, which not only give the receiver power to send for persons and papers, and to examine any person respecting the debts, obligations, contracts and liabilities of the concern, but also empower him, in case any person shall refuse to appear or to make answer to such questions as may be put, to report to the Court of Chancery, which may commit such persons to prison until they shall submit to the examination.

In view of these provisions considerable interest attaches toward the next step to be taken by the receiver. It is said that while the men summoned to appear at the hearing before the receiver might dispute his authority while in Pennsylvania there was no doubt as to his power to compel them to answer all questions that might be put to them if they could be found on Jersey soil, and that in case they refused to answer these questions or attempted to evade his summons they could very properly be held for contempt.

"Civic Affairs" in Grand Rapids

OF all the civic organs published in the interest of any local improvement association few measure up to and none excel that known as "Civic Affairs," published by the Civic Club of Grand Rapids and edited by Dr. Delos F. Wilcox. Its editorial notes are pertinent and timely, and every leading article in its May-June issue cannot fail to be of great local value and would be sure to interest other cities having similar problems to solve. For example, its leading articles are as follows: "Grooved Rails for Grand Rapids Street Railways," "Grade Crossings and Franchise Grants," "The Public Comfort Station," "The Cost of Water Supply in Grand Rapids." On its title page it is said: "This magazine will be sent free to any address on request." This, we assume, applies only to Grand Rapids, yet, no doubt, occasional copies will be sent to city officials elsewhere. Good city government would be promoted in any community by such a local organ.

Street Signs for Columbus

MAYOR JEFFREY, of Columbus, Ohio, is reported as favoring an appropriation of $7,000 to be expended for street signs for all the streets and alleys of that city. This will be a decided improvement for the Capital city and one that has long been needed. There are few cities of any size in this country that are well cared for in this particular. Either there are no signs at all to direct the "stranger within the gates" or else they are placed in some out of the way or inconspicuous place so that it would take a detective to find them. Street signs are comparatively inexpensive in first cost, and there is next to no expense in their maintenance, and for this reason there is no good excuse for cities and towns leaving their streets unmarked. It is to be hoped that other municipalities may soon follow the example of Columbus.

A Useful Merchants' Association

The Merchants' Association of San Francisco deserves all the good things that can be said about it. It was born in adversity and, like most goods things, was crystalized into usefulness by the genius of a good woman. Its original objects were first of all to unfurl the banner of good citizenship which had been buried in the dust and dirt and corruption in San Francisco. Next it was to better the material conditions which then prevailed. But, better than all, it was to crystalize, to strengthen and to organize ideals in the business community. As a result of intelligent co-operation it has during the past decade improved the conditions of

street cleaning, sprinkling, lighting and paving; secured the setting aside of certain streets for boulevards; determined the value of sea water for sprinkling; assisted in securing a new charter and strongly supported civil service in the city government.

Mayor Low's Successor

IT is not a great strain upon the imagination to construct synthetically the condition of mind of former Mayor Seth Low when he realized that the people of New York had elected the young Congressman, George B. McClellan, as their Mayor. Rudely shocked, amazed and displeased he doubtless in the first burst of indignation at the foolish citizens wished, Pilot-like, to wash his hands of the whole business. A second thought and one more in consonance with the monumentally wooden self-complacency of the man, must have led him to exclaim *soto voce*: "After me, the deluge!"

The deluge has not arrived up to the hour of going to press. The attitude of the young Congressman prior to taking the Mayor's chair was in perfect taste. During the six months that he has been Mayor his administration has commanded the respect of decent men of all shades of political opinion, and but one public act of his has been criticized—the signing of the Remsen gas bill—an act on which there is much to be said on both sides.

When former Mayor Low returned from abroad he was told by his friends and the press that Mayor McClellan was giving New York a clean and sound administration; that while not nominally a reformer he was dealing in practical reform, and that he was to be classed as an undoubted vertebrate, his most salient characteristic being the possession of a backbone. As the former mayor received this information dourly and failed to congratulate New York on the happy circumstance of having secured a desirable Burgomaster, it is but natural to surmise—in view of his known characteristics—that he is bitterly disappointed because the deluge has not arrived as per his mental schedule.

It is not so much what Mayor McClellan has done as what he has not done that is cause for congratulation. He is giving the city a business administration, without frills, and singularly free from political intermeddling. So far he might stand as the apotheosis of common sense. As an illustration of his clean cut methods we have but to observe how he facilitates the business of the bodies over which he presides. Mr. Low used to call a meeting of the Board of Estimate and Apportionment—for example—at 11 A. M. At 12.30 an adjournment for luncheon was in order. Reconvened at two o'clock, the board frequently sat until four, soggy with the domination of a personality that was slow, ponderous and smug. Mayor McClellan calls the board together at 11 A. M. Its business is frequently completed and adjournment taken by 11.45. This brisk, practical way of disposing of public business is partly due to Mr. McClellan's training on committees during his five terms as a Congressman, but it is also due to the fact that when he presides at a civic meeting he is there for business and not for posing.

Contrary to the advice of grafting politicians, Mayor McClellan retained Mr. Low's Street Cleaning Commissioner, Major Woodbury. It took backbone to do it, but New York is delighted with the action of the Mayor, and the politicians will recover in time even if the street sweepers are thus taken out of politics. In spite of great pressure the Mayor has announced that:

"Not while I am here will any attempt to force the Commissioner out succeed. I look upon Commissioner Woodbury as one of the best officers of the administration, and so long as I am Mayor the only way he will leave the service of the city will be by resigning, and I am assured he has no intention of resigning."

Against the wishes of the tin-horn gamblers and professional law breakers—who claim fealty from the Mayor because they say they contributed to the campaign fund—Mr. McClellan appointed a Police Commissioner whose hands were not sticky with asphalt. The gamblers and law breakers swear they will never again vote with "the organization," because they have been "betrayed" by a Mayor who appointed a Police Commissioner with a backbone.

Six months of administration is too short a time in which to weigh and analyze the Mayor of the metropolis. It would be mere sentiment to pronounce a panegyric upon the young Mayor at this time. As he is, however, expanding hourly into a National figure, an unprejudiced view of his public attitude thus far indicates the possession on his part of four qualities dear to every decent American—modesty, ability, honesty and, last but not least, backbone.

Next Meeting of the League

SECRETARY MACVICAR, of the League of American Municipalities, writes that plans for the next session of the League, which will be held at St. Louis Oct. 4, 5 and 6, are well under way and that a most attractive program is assured. The following subjects have been covered and will be seen to promise an attractive "bill of fare" for city officials throughout the country: Municipal charters, garbage disposal, street lighting, sewage disposal, filtration of water, street paving, the (New York) Ford franchise tax law, what utilities should a municipality own? what improvements should a city do by contract? how to equalize taxation, special assessments, a glimpse at the history of municipal progress.

Among the speakers already pledged to take a place on the program are: Hon. James M. Head, former mayor of Nashville and president of the League; Hon. Samuel M. Jones, Mayor of Toledo; James F. O'Connor, Esq., chief clerk of the Chicago Board of Local Improvements, who will discuss the subject of "Special Assessments." "The Operation of a Municipal Gas Plant" will be described by L. N. Case, Esq., manager and secretary of the Duluth Water and Light Commission. The well-known "Ford Franchise Tax Law" will be discussed by its author, Hon. John Ford of New York. "Sewage Disposal" will be treated by Morrell Vrooman, Esq., of East Gloversville, N. Y. The Hon. Hugo Grosser, of Chicago, who contributed such an excellent address at the Baltimore convention, will take up the subject of "Municipal Charters." Prof. Frank Parsons, of Boston, will present a paper on "A Glimpse at the History of Municipal Progress." City Clerk DeWitt of Cleveland, Ohio, who has had much experience, will talk about "How

to Assess Real Estate." Other speakers will be announced in succeeding numbers of the MUNICIPAL JOURNAL AND ENGINEER.

There are two reasons why every municipality should be represented at this session of the League: First, because of its attractive program. More can be learned in four days' time by aggressive city officials by listening to papers upon municipal topics and entering into the discussion which follows and by conversations with other delegates than in a year of study. The second reason for attending this session will be found in "The Model City Exhibit" which has been arranged for by the Exposition authorities. This exhibit is under the able management of Mr. Albert Kelsey, of Philadelphia, who has made a special study of this subject for years, supplementing his studies by travel at home and abroad. No one has given more time nor taken greater pains than he to produce something worthy of a trip across the Continent to see, and we do not hesitate in saying that that city official who turns down this opportunity to inform himself upon municipal matters will make a grave mistake, for it is more than likely that not another equal chance will be given him during his lifetime.

The Death of Mayor McLane

AMONG members of the League of American Municipalities, especially those who attended the convention at Baltimore last October, no death of a public official will be more keenly felt than that of Robert M. McLane, late mayor of Baltimore. Uniformly courteous and solicitous for the welfare of every guest, he was recognized as a model host. None will recall his acquaintance at that convention but with the pleasantest memories, and none will learn of his death but with heartfelt sorrow. In our June issue we announced, with congratulations, his marriage to a charming women of his own city, and here it is our painful duty to record his death, which occurred on May 30.

No more appreciative words could be spoken than those contained in an editorial of the Baltimore *News* the day after the unhappy event, which summed up his public acts as Mayor as follows:

"In the all too brief life-record of the departed mayor, the thing that stands out pre-eminent is his unswerving execution of every official duty, in strict accordance with his conception of the obligation laid upon him. As State's attorney, he adhered to an ideal standard of rectitude and efficiency in the conduct of his important office, and it was the high reputation he won in that post that made him so strong a candidate for the mayoralty. Upon his installation in that office he immediately showed that he would administer his office as a public trust, unswerved by the solicitations of politicians, and undismayed by their hostility. When confronted with the great calamity of the fire, he bent himself loyally to the arduous work that confronted him, work of a kind that he had had no reason to look forward to, and that his training had not prepared him for. Upon every aspect of the large questions connected with the city's government he took, consistently and firmly, the stand that comported with the idea of a large and liberal and progressive movement for the city. His choice of members of the Burnt District Commission was unfortunate, but it was never hinted by anyone that this was due to anything else than an error of judgment. Neither the opposition of politicians, big or little, nor the temptations of immediate convenience, in any shape, deterred him from taking, upon every public question, the stand that he felt to be right. A man of fine intellectual powers, of a high sense of honor, of many personal attractions and with so much in his lot that gives charm and grace to life, it is with a feeling of infinite sadness that one contemplates the tragedy which brought his life to so untimely an end."

The Mayor of Indianapolis

As a reform mayor, John W. Holtzman, is making a record in Indianapolis. Although the candidate on the Democratic ticket, he owes his election last fall largely to Republican votes. Since taking office, Mayor Holtzman has given Indianapolis an administration which for the most part has not been colored with any great degree of partisanship. The most notable achievement so far has been the making of a new ten-year electric lighting contract which the city was authorized to enter into under a special act passed by the Indiana Legislature in 1903. The specifications were broad and the outside bidders pronounced them attractive to competition. The contract was awarded to the Indianapolis Light and Power Co. which bid $74 a light annually for enclosed arc lamp using direct current. This is for an all-night service each night in the year. The minimum number of lights under the contract is to be 1,600 and the city has the option of ordering as many more as are desired. The same Company had the contract at $85 a light open arc lamp on the moonlight schedule. The gain of $11 a year on each light with an improved lamp, on an all-night schedule, is considered an important victory for the city. This was largely due to competition.

MAYOR HOLTZMAN

Although the contract was for public lighting, the specifications carried certain conditions which are considered advantageous concessions to private consumers of electric current. The maximum rate for commercial purposes is fixed at 10 cents per thousand watts. Formerly a minimum charge of $1 a month was permitted but under the new contract, charges can only be made for current actually consumed.

Under the contract, the company pays into the city treasury each year, 5 per cent. of its gross receipts from all sources. It also agrees to furnish a fifty candle-power incandescent lamp at $35 a year which will be used to replace vapor lights, now in use and giving poor satisfaction. In the mile square, or business district, all wires are underground. The poles and arms are to be of an artistic metal type. The specifications on which this contract was made, were drawn by the city engineer and approved by the Commercial Club. Then they were published two weeks to give the public an opportunity to discuss them, after which they were amended and adopted by the Board of Public Works.

Personalities

—Captain W. L. Rice (Democrat) has been re-elected Mayor of Bristol, Va.

—Mayor Bergunathal, of Topeka, is beset on all sides by petitions for improved city pavements.

—Landscape Architect Olmstead, of Brookline, Mass., paid a professional visit to Rochester's parks recently.

—County Health Officer George E. Hill, Bridgeport, Conn., has started a campaign for pure water for his city.

—City Engineer E. A. Fisher, of Rochester, N. Y., is engaged in revising detailed plans for the proposed new reservoir.

—S. A. Mitchell, chief engineer of the Kansas City Water Works, has prepared specifications for a 25,000,000-gallon centrifugal pump.

—Corporation Counsel George L. Record, of Jersey City, is keeping a vigilant eye upon the water companies which are fighting Jersey City.

—Thanks to Mayor Lynch and the Committee on Public Property, Lawrence, Mass., is to have a new band stand ready for business on July 4.

—Mayor J. C. Haynes, of Minneapolis, gave the Aldermen two chances to reconsider their action on a paving contract before he finally signed it.

—Mayor Rose, of Milwaukee, is desirous of purchasing the Kneeland Homestead in that city and transforming it into a beautiful small public park.

—Mayor S. M. Jones, of Toledo, O., recently made a trip east for the purpose of investigating the different plans, and installed systems of water supply.

—Mayor Hardwick, of Erie, Pa., is shown by investigation to be absolutely free from complicity with the scandal arising out of the purchase of stone.

—Dr. Riddick, Mayor of Norfolk, Va., was recently invited to attend a campaign meeting conducted by H. L. Page, the opposing candidate for the mayoralty.

—Judge Robinson, of the Common Pleas Court, recently handed down a decision that in villages of Ohio the mayor has not the right of veto of the acts of council.

—Mayor Edwin Clay Timanus, of Baltimore, successor to the lamented Robert M. McLane, says he is the city's servant and wants everyone to feel at home in his office.

—Governor Blanchard's million dollar bond issue in the interest of education in Louisiana was approved by an almost unanimous vote of the School Board of New Orleans.

—Mayor Frank L. Kelly, of Chatham, N. J., recently became bondsman for one of the marshals of the town who was arrested for arresting a citizen for speeding his automobile.

—Captain McCarthy, who was elected Mayor of Richmond, Va., on June 14, is said by *The Times* of that city to be a brilliant man, full of energy, originality and public spirit.

—Mayor Lankering, of Hoboken, N. J., upon the invitation of the Hackensack Water Company, recently visited New Milford to inspect the great filtration plant in course of erection at that place.

—Mayor Smith, of Missoula, Mont., says that the fight for municipal ownership has but fairly begun; that it will be his battle cry at the next election and will continue to be his platform until victorious.

—Hon. W. M. Drennen, Mayor of Birmingham, Ala., received a letter some time ago from an officer of the Southeastern Tariff Association relative to placing Birmingham on a first-class insurance basis.

—Corporation Counsel D. L. Donnelly, of Sacramento, Cal., through an error in drafting the ordinance calling for the High School bond election, has rendered that instrument void and causing a loss to the city of about $4,000.

—Councilman J. S. Zacharie, of New Orleans, working in conjunction with Mr. Thomas F. Cunningham, president of the New Orleans Parish Good Roads Association, has introduced an ordinance for the creation of a boulevard in New Orleans.

—Commissioner of Education Buel C. Andrews, of Albany, N. Y., acknowledged recently that Albany is behind most cities in her High School building and is even behind many small places in this respect. Commissioner Andrews advocates a new building surrounded by spacious grounds.

Convention Dates

AUGUST

The League of Georgia Municipalities will convene at Savannah, Ga., August 10, 1904. Mayor Bailey, secretary, Griffin, Ga.

The National Firemen's Association will hold its anual convention at St. Louis, Mo., August 22-27. D. W. Gillen, secretary, 176 Monroe street, Chicago, Ill.

SEPTEMBER

The annual convention of the International Association of Fire Engineers will be held at Chattanooga, Tenn., September 14-17. Henry A. Hills, secretary, Wyoming, O.

OCTOBER

League of American Municipalities will meet in seventh annual convention at St. Louis, Mo., October 4-6. Hon. John MacVicar, secretary, Des Moines, Ia.

Spread of Municipal Insurance in England

THE municipal insurance scheme, started a year or so ago by Shoreditch and other boroughs of London, England, has been so successful that it has been proposed to establish a branch, or branches, in the north of England to include the counties of Yorkshire, Lincoln, Derby, and counties north of these. Until the scheme has been thoroughly organized, an official from the main offices in London is to have charge of affairs. It is desired that one of the cities in Yorkshire allow the use of a room for an office and for meetings, and the use of a telephone at a small rental, as is done by the borough of Shoreditch. A committee will manage the business in the north counties and a delegate from this board will attend meetings of the committee in London. The idea has been enthusiastically received by Yorkshire.

WATER-WORKS CONVENTION AT ST. LOUIS.

THE twenty-fourth annual convention of the American Water Works Association was held at St. Louis, on the 6th, 7th, 8th, 9th, 10th and 11th days of June. The unusual length of the period for holding the convention was due to the programme, which provided for the combining of pleasure with business. The recreative part of the programme included automobile rides and visits to the World's Fair grounds, where special entertainments were given by the various attractions. The catholic tastes of the members of the convention is evidenced by the fact that the amusements included a visit to a brewery, the race track and a baseball game. Notwithstanding these frivolities, the serious work of the convention was in no way impaired.

Of a total membership list of 400, about 250 attended the convention. Among the important papers read, that of Professor Edward W. Bemis, on "The Meter System in Cleveland, Ohio," appears in full in another part of this issue.

It is of interest to note that about sixty new members were added to the association, at St. Louis, bringing the membership up to about 500. A joint committee of the Union Engineering Building, New York City, suggested that the association share in the accommodations of the building, but as the association has no permanent funds—the financial statement showed a cash balance of $150—has no large library, and rarely meets in New York, the invitation was courteously declined.

Business transacted by the convention included the selection of West Baden, Ind., as the place at which the meeting is to be held next year. A number of amendments to the constitution of the association were adopted provisionally. Officers elected for the coming year were as follows:

President, M. R. Sherrerd, Newark, N. J.; vice-president, B. C. Adkins, St. Louis, Mo.; F. H. Bennett, Oswego, N. Y.; C. E. Rowe, Dayton, Ohio; D. H. Maury, Peoria, Ill.; A. A. Tucker, Memphis, Tenn.; secretary-treasurer, J. M. Diven, Elmira, N. Y.; finance committee: H. E. Keller, Chicago, Ill.; A. Milne, St. Catharines, Ont.; R. J. Thomas, Lowell, Mass.

The professional proceedings of the meeting were of great interest. The questions most eagerly discussed related to private fire services, water rates and meters. The opening address of President L. N. Case, was listened to with marked attention. A number of papers were read by title only, receiving no discussion. Professor Bemis' paper showed the marked diminution of consumption per capita brought about by metering.

Mr. J. W. Alvord, of Chicago, showed the members an interesting diagram of prices of cast-iron pipe, covering a period of twenty years, taken from quotations in engineering journals. The diagram indicated a period of about three years between maxima, no violent fluctuations being apparent.

The former chief engineer of the Aqueduct Commission of New York City, Mr. W. R. Hill, presented a paper on "Modification of the Plant of the New Croton Dam," which created considerable discussion. He pointed out the reasons which led him to reconstruct part of the work, after its completion. The principal cause of the change lay in the fact that the rock at the base of the dam was faulty, and it became necessary to deepen the foundation in order to be sure of the stability of the structure.

Interesting discussion followed the papers relating to private fire services. Among them was one by President L. N. Case, of Duluth, Minn., on "Private Fire Systems," in which he pointed out the methods used in Duluth to prevent the stealing and waste of water in private water services. When the fire and ordinary service is combined in one pipe system, the Duluth method is to meter the entire service and to charge regular rates for all water used for other than fire purposes. An annual charge [$5 to $50], is made for fire service and inspection. Mr. Case does not believe in metering fire services for several reasons.

"Water Service at the Baltimore Fire," was the title of an interesting and important paper by Mr. A. M. Quick, of Baltimore, in which was given a lucid description of the water system of his city, and its practical value during the great conflagration. The supply of water in Baltimore, Mr. Quick points out, was adequate for all purposes and that the pressure remained normal during the great fire. He concludes that there are some fires which no water supply system will be able to quench. He believes in a liberal excess of storage and in the encouragement of private fire services. In this connection the report of the committee on insurance is important. The committee stated that it had conferred with the National Fire Protection Association, in order to reach a basis of agreement upon a system of installing private fire lines, which would be mutually agreeable to the underwriters and the water department. No definite conclusion having been arrived at, the committee will be continued for at least another year.

Questions relating to water meters and water rates, as usual, excited great interest. The advantages derived from meters and how metered water should be charged for, were gone into at considerable length. In addition to the paper by Professor Bemis, was one by Mr. Park Woodward, of Atlanta, Ga., entitled "Meters, Their Use and Benefits," in which he described the benefits resulting from metering in Atlanta, one result being a reduction in daily pumpage from 25,000,000 to 8,000,000 gallons. The subject was supplemented by a paper by Mr. J. B. Heim, of Madison, Wis., on "Meter Rates," and one by Mr. F. C. Kimball, of Boston, on "The Equity of a Minimum Charge for Metered Services." Mr. J. W. Alvord joined the discussion by expressing doubt as to whether meters are economical in all cases.

Algal growths in drinking water was treated of in a paper by Mr. O. T. Smith, of Freeport, Ill., the title of which was "Experience with Growths in Water Mains." The methods employed to cope with the evil were filtration, aeration, coagulation and flushing.

Among the other papers presented was one of considerable interest, illustrated with lantern-slide views by Mr. D. H. Maury, of Peoria, Ill., on the subject of "Some Recent Developments in Wells and Pumps." The evolution of the turbine pump was referred to and descriptions given of new forms of well making.

Draining Massachusetts' Roads

NOTHING has occurred to change the opinion of the members of the Massachusetts State Highway Commission regarding the use of Telford foundation for road building. No return to this method will be made. On heavy, wet soils a center "V"-shaped drain has been substituted for the side drains and telfording. This idea of preparing the foundation is unique and will be of interest to other road builders. The report says: "The earth is loosened and thrown out towards the sides so as to give a "V"-shaped trench with its greatest depth in the center of the roadway. Narrow trenches are cut through the sides of this center trench, at intervals of fifty feet or more, connecting its lowest part with the gutters on the side, and placed at a depth and slope to thoroughly remove all water. The center and cross trenches are filled with field or wall stones, the depth of this stone varying from twelve to eighteen inches in the center, and from six to twelve inches on the sides. The thickness being dependent on the character of the soil in the subgrade. The tops of these stones are given a crown to receive the surfacing material." Earth, gravel, or broken stone is then spread in the usual way. This method of draining has proved entirely efficient and so the question of cost between this method and telfording with side drains becomes the determining factor.

The average cost of side drains on twenty contracts made in 1903 amounted to 47 cents per foot. In 1900 the average cost of telfording on twenty-eight contracts amounted to 32.7 cents per square yard. Thus, the cost per lineal foot for telfording with two side drains was $1,267, or 83.8 cents for telfording and one side drain. In building the "V"-shaped drain about one-quarter of a cubic yard of earth is excavated and about one-half a cubic yard of stone is placed for each lineal foot of road. On seventy-three contracts, the average cost of excavating was 43.9 cents per cubic yard; for the stone in place the cost averaged 76.7 cents a cubic yard. Thus, the cost for the drain is 49.3 cents per lineal foot of road. Comparing these prices with those for telfording, it is evident that a saving of 77.4 cents per foot of road is made over telfording and two drains, and 34.5 cents per foot over telfording and one drain.

The Ventilation of Sewers

IN summing up his conclusions on the ventilation of sewers, as given in his paper before the Association of Municipal and County Engineers, England, Mr. H. Gilbert Wyatt, C. E., found that the ventilation of sewers at the street level is both objectionable and dangerous. Ventilation by alternate surface openings and tall shafts is unsatisfactory in practice, as the inlet is often through the shaft, contrary to theory. Filtration of sewer air, while passing through surface openings, is a failure. The destruction of sewer gas by cremation, the prevention of the formation of this gas by chemicals, and the mechanical removal of it by fans, are too expensive for ordinary use. The use of factory chimneys or a few shafts of large sectional area is not satisfactory as the influence is often local. The solution of the problem seems to be the use of a large number of moderate size shafts at frequent intervals, all being provided with rust pockets. Sewers must be regularly and frequently flushed. The ventilation of the drain between the sewer and the house trap should be cared for by the builder of the house. From fifty-eight replies to a series of questions sent out to boroughs and borough councils, it appeared that in forty-eight places the sewers were ventilated, forty-five of these having manhole and surface ventilation either alone or in combination with shafts, and eleven of the fifty-eight no surface ventilation. One town, Carlisle, has twenty-nine chimney shafts. Torquay has over 2,000 shafts carried up from the sewer side of the intercepting house trap. The majority of towns use wire nettings on top of shafts, only seven using cowls. Sixteen towns stated that the shafts acted often as inlets. In a large number of cases the health of these towns was materially lowered because of sewer ventilation.

Salt Lake City Wants Cheaper Lights

AGITATION against the high prices paid by Salt Lake City, Utah, for its arc lighting from a private company, has been going on for some time and Mayor Richard P. Morris has contributed to the movement by compiling a table showing what other cities are paying for arc lighting. The cities included own their own plants and use steam for a motive power, and the candle-power of the arc is 2,000. Salt Lake is paying $72 per arc per year at present, and the company supplying the lights uses water-power which, of course, is cheaper than burning coal. Mayor Morris thinks this city should get light for $50 per arc from a municipal plant. The table on which Mayor Morris based his statements was as follows:

	Number street lights, 2,000 c. p.	Average hours burned per day.	Average cost of coal, per ton.	Annual operating expenses, per arc.	Taxes, insurance and depreciation at 50 per cent. on investment.	Total cost per arc under public ownership.	Interest per arc at 4 per cent.	Investment per arc.
Dunkirk, N. Y.....	75	8	$1.45	$39.50	$14.00	$53.50	$11.00	$2.80
West Troy, N. Y...	115	10½	3.15	61.00	14.00	70.50	11.00	2.80
Easton, Pa.	141	10½	2.85	80.00	15.00	95.00	12.00	3.00
Bay City, Mich....	209	7	1.80	42.50	9.33	52.00	7.50	1.87
cDetroit, Mich.	1868	10½	2.10	46.50	15.00	61.50	12.00	3.00
Chicago, So. Pk. Plt.	490	6	3.90	42.00	15.00	57.00	11.50	2.90
Aurora, Ill.	233	6	1.75	40.00	10.00	50.00	8.00	2.00
Little Rock, Ark...	212	7	2.55	41.25	8.00	49.50	8.50	1.65
Peabody, Mass.	450	10	3.25	51.00	10.50	61.50	8.50	2.10
Jamestown, N. Y...	*78	11	1.60	36.00	13.00	49.00	10.50	2.60
Danvers, Mass.	*118	5¾	3.00	46.00	10.50	56.50	8.50	2.10
So. Norwalk, Conn.**	100	6	2.80	36.50	11.00	47.50	9.00	2.20
Braintree, Mass. ..	*170	7½	3.05	47.50	14.00	61.50	11.50	2.80
Salt Lake City.....	480	***	2.75	....	....	72.00	....	...

Brockville's Chief of Police Dismissed

QUITE a local tempest in a teapot was raging for a time in Brockville, Can., over the question of the dismissal or retention of Adams, the Chief of Police. At a regular meeting of the town council the police committee presented a report asking endorsation of their action taken some time ago in dismissing Chief Adams. That officer refused to be dismissed, claiming that the committee had no legal right to dismiss him. He, therefore, remained on duty until the matter was finally disposed of by the casting vote of Mayor Geash, who supported the committee after a heated discussion in the presence of hundreds of citizens. A petition signed by 700 leading citizens was presented asking that the services of Adams be retained.

NEWS AND PRACTICE AMONG THE CITIES

Street and Sewer Work in Springfield—Charleston Passes Theater Regulations—Officials Should Use City's Money Wisely

San Francisco's Budget for 1904

San Francisco's municipal budget for 1904-1905 amounts to $7,384,836. The assessment roll will amount to $465,000,000, approximately. The budget for 1903-1904 was $6,150,400, and the assessed value of taxable property, was $422,000,000. The tax rate is fixed at $1.2053 on each $100 of assessed valuation for city and county purposes, to which will be added the levy for State purposes. The budget includes more than $500,000 for permanent improvements.

Charleston Passes Theatre Regulations

A theatre ordinance has been passed in Charleston, S. C., providing that all such buildings be provided with asbestos curtains and proper fire escapes and exits, to be kept in good order by the owners. In addition each theatre must be provided with eight three-gallon fire extinguishers, two axes, two fire hooks, barrels and fire buckets ready for use. The fire aparatus must be approved by the Chief of the Fire Department and be located under his directions. Hose connected to the stand-pipes must be long enough to reach to all parts of the stage and underneath and have one-inch shut-off nozzles on each line. A red light of gas or oil must burn at each exit during performances, and gas pipes supplying such lights must be distinct from other gas pipes in the house.

One or more firemen must have charge of apparatus during performances, the men to be assigned by the Chief of the Fire Department. No smoking is allowed in any part of the house during performances under penalty of $5 for each offense, except by actors on the stage as a part of the play. Violations of the ordinance are to be subject to a fine of $50 a day and imprisonment.

Street and Sewer Work in Springfield

About 75 per cent. more macadam pavement was laid in Springfield, Mass., in 1903 than the year previous, but the amount of permanent pavement put down was somewhat less according to Superintendent of Street and Sewers A. A. Adams. An increase of 2.45 miles of streets watered over 1902 was reported, seventy-seven miles being thus cared for in 1903. About fourteen miles were watered by cars under contract with the American Car Sprinkler Co., of Worcester. All work on sewers was done by departmental labor and a substantial reduction in the cost of sewers to the city has been obtained. At present there are 24.84 miles of brick sewers, 46.13 miles of clay pipe, 27.32 miles of cement pipe, and 2.34 miles of sewers built of miscellaneous materials.

City Engineer Charles M. Slocum reported that the work of his department for 1903 was of a general character with little special undertakings. This gave more time for compiling records that much time will be saved in the future in obtaining desired information from them as the city engineer's office is considered a bureau of information to which every one may refer. The amount of new paving laid was 8,128 square yards 5,652 square yards of this amount were of creosinate wood block laid on a six-inch concrete base with one-inch sand cushion at $3.58 per square yard which includes $2.10 for all blocks used; 914 square yards were of Metropolitan block on six-inch concrete at $2.31 per square yard; 1,003 square yards were of Syracuse brick on six-inch concrete at $2.53 per square yard; and 132 square yards of Catskill and Metropolitan blocks on six-inch concrete at $2.77 per square yard.

Officials Should Use City's Money Wisely

In entering on his duties, Mayor Edwin F. Sweet, of Grand Rapids, Mich., called attention to the need of exercising the same care in the use of the City's funds as a private person would use with his own money. Fair compensation should be given all city employees, but good service is demanded by the people and no more clerks should be employed than good service demands.

"The fact that the city and not a private individual is the employer, that the money which pays the salary or wages comes from a large number of people, and not from a single individual, should make no difference whatever. We should regard ourselves as directors in the great business enterprise of suitably conducting the affairs of the corporation known as the city of Grand Rapids. The construction of a brick pavement for the city is a business matter just as truly as the construction of a brick building for an individual. In both cases there is involved the question of durability of material, quality of workmanship and reasonableness of cost. If done by contract, the specifications should be strictly followed in both cases and the party who pays the bills should get what is paid for. It is a question of value received; and as faithful public servants, it is our duty to see that the city, so far as possible, gets value received for every dollar paid out."

Mayor Sweet said that the liquor traffic should be kept out of the hands of those who showed a disposition to evade the laws. He considers that conditions require the sale of liquors and so wished that the business be conducted openly and decently. The final remedy for the evil is in moral training in the home.

He considered it a mistake that the city plant should not light the public buildings and suggested that the heat from the garbage plant be used to run the lighting plant. The latter plant should be located at the pumping plant. The city should keep up street repairs by constantly remedying such poor places in the pavements as occur from time to time, and thus greatly prolong the life of the paving. The acceptance of free transportation on the street railways by the aldermen Mayor Sweet condemns as wrong in principle as tending to dull the conscience and ultimately to lead to the acceptance of favors of greater magnitude.

Police Chief Wants Curfew Law

IN the report of Chief of Police Charles F. Evans, of Williamsport, Pa., will be found sound argument for the institution of a curfew law. A law of this character was defeated last year, but he renews his recommendation for it nevertheless. It was argued that such a law would reflect upon the city; he said he had no sympathy with such an idea, for there was "no virtue in pretending to be better than we are." The opinion of outsiders had nothing to do with the matter. If conditions justified it, let the law be passed, and his observations showed that the city needed it, as "there exists a lamentable lack of parental control over large numbers of children when they most need a guiding hand." He asked for an increase in the force which now consists of but eighteen men and the Chief, only the Chief and four men being on duty during the day. One man looks after the residence sections. One patrolman has 18.67 miles of streets to cover.

Acetylene Lighting at St. Louis

PROBABLY the most lavish display of the system of lighting with acetylene gas is to be seen at St. Louis at the Christian Endeavor Hotel, a structure having 1,200 rooms besides an auditorium. This building covers a ground area of 400x800 feet. The dining-room has seats for 2,400 people. A total of 4,000 acetylene lights are employed, of which 160 double jets appear in the dining room.

The acetylene installation in this building consists of two 200-pound generators and a 1,500-foot gas holder. The generators are of the non-automatic Eagle type and are capable of furnishing 6,000 feet of gas per hour at the maximum. At the present time the daily carbide consumption is about 1,000 pounds, thus generating in the neighborhood of 5,000 feet of acetylene per day. When every room is occupied and all the space in the rotunda, the daily carbide consumption will probably aggregate between 1,500 and 2,000 pounds.

In addition to the hotel proper is the auditorium, which will seat 3,000 people. This structure will require nearly 1,000 additional lights; the object of the building being the holding of Christian Endeavor conventions and other meetings during the World's Fair. Arrangements already indicate that educators of all schools and nations will hold meetings within this edifice. The Century chorus choir of 1,000 voices will sing in the auditorium every Sunday afternoon during the fair.

Another of the large hotels illuminated by acetylene is the Forest Park. This hotel has accommodations for 1,500 people, requiring an aggregate of about 1,000 lights. The proprietors after testing the brilliancy of acetylene concluded that a ¼ foot burner in each would give an abundant light to illuminate the rooms, the walls, ceiling and furniture of which are white.

Another feature of the Louisiana Purchase Fair, in which acetylene is represented, is the gospel car in the Transportation building. This car is named the Chapel car, and it is peculiar among the exhibits in the respect that religious exercises are held therein. It is a beautiful car and has been the object of much attention.

There is a creditable exhibition of acetylene devices in the Manufacturers' building near the main entrance.

There is also an exhibit of much interest along acetylene lines in the Mines and Metallurgy building.

Bonding of Municipal Officials

VARIOUS systems and sometimes no system at all obtain in different cites in regard to the bonding of municipal officials. The bonding of the holders of the more important offices is usually regulated by the terms of the charter. In New York, for instance, the Sheriff is required by the charter to furnish a bond for $100,000, while it is left optional with the sheriff as to whether the officials under him be bonded or not. The amount paid to the Trust company for the bond comes, in New York, out of the pocket of the office-holder, and is not, as in some places, paid out of the public funds.

It would be interesting to know by what process of calculation the guarantee companies arrive at a conclusion regarding the percentage to be charged. In this connection the subjoined table seems to indicate that there is a wide divergence of opinion as to what the charge should be. The committee on ways and means of the Detroit Common Council, recently advertised for proposals for official bonds with the following result:

OFFICE.	Term years.	Amount of Bond.	Fidelity & Deposit of Maryland.	National Surety Co.	Bankers' Surety Co.	American Bonding Co. of Baltimore.	U. S. Fidelity & Guarantee Co.	Gross.	American Surety Co. Net.
City Controller	3	$30,000	$171.00	$90.00	$225.00	$180.00	$120.00	$90.00	$60.00
Deputy Controller	3	20,000	114.00	75.00	150.00	120.00	80.00	60.00	40.00
City Clerk	2	3,000	14.25	12.00	15.00	12.00	10.00	20.00	13.33 1-3
Deputy City Clery	2	2,000	9.50	10.00	10.00	8.00	7.00	20.00	13.33 1-3
Receiver Taxes	3	50,000	495.00	285.00	375.00	300.00	350.00	.....	.....
Corporation Counsel	4	5,000	37.50	24.00	50.00	40.00	27.00	40.00	26.66 2-3
Chief Accountant	2	5,000	19.50	12.00	25.00	20.00	13.50	20.00	13.33 1-3
Clerk Police Court	2	2,000	9.75	8.00	10.00	8.00	10.00	20.00	13.33 1-3
Assistant Clerk Police Court (3)	2	2,000	9.75	8.00	10.00	8.00	10.00	20.00	13.33 1-3
Assesor	3	10,000	57.00	45.00	75.00	60.00	50.00	30.00	20.00
Boiler Inspector	3	5,000	25.00	18.00	37.50	30.00	27.00	60.00	40.00
Assistant Boiler Inspector (2)	3	1,000	6.00	6.00	7.50	6.00	6.00	30.00	20.00
Secretary Common Council Com.	2	1,000	4.75	4.00	5.00	5.00	5.00	10.00	6.66 2-3
Market Clerks (2)	1	3,000	7.50	6.00	7.50	6.00	6.00	10.00	6.66 2-3
Weighmasters and Poundmasters (2)	1	2,000	5.00	4.00	5.00	5.00	5.00	10.00	6.66 2-3
City Physicians (5)	1	2,000	2.50	3.00	5.00	5.00	5.00	10.00	6.66 2-3
Superintendent of Poor	1	5,000	10.00	6.00	12.50	10.00	7.50	10.00	6.66 2-3
Secretary Poor Commission	1	5,000	10.00	6.00	12.50	10.00	7.50	10.00	6.66 2-3
Constables (17)	2	2,000	.....	6.00	.....	.....	.....	.....	.....
Chimney Sweep	2	500	2.50	4.00	1.25	.....	5.00	.....	.....

The National Surety Company being the lowest bidder, the committee recommended that the Comptroller be directed to contract with the said company for furnishing the bonds, which was accordingly done.

ELEVATED CAR FOR FIRE FIGHTING*

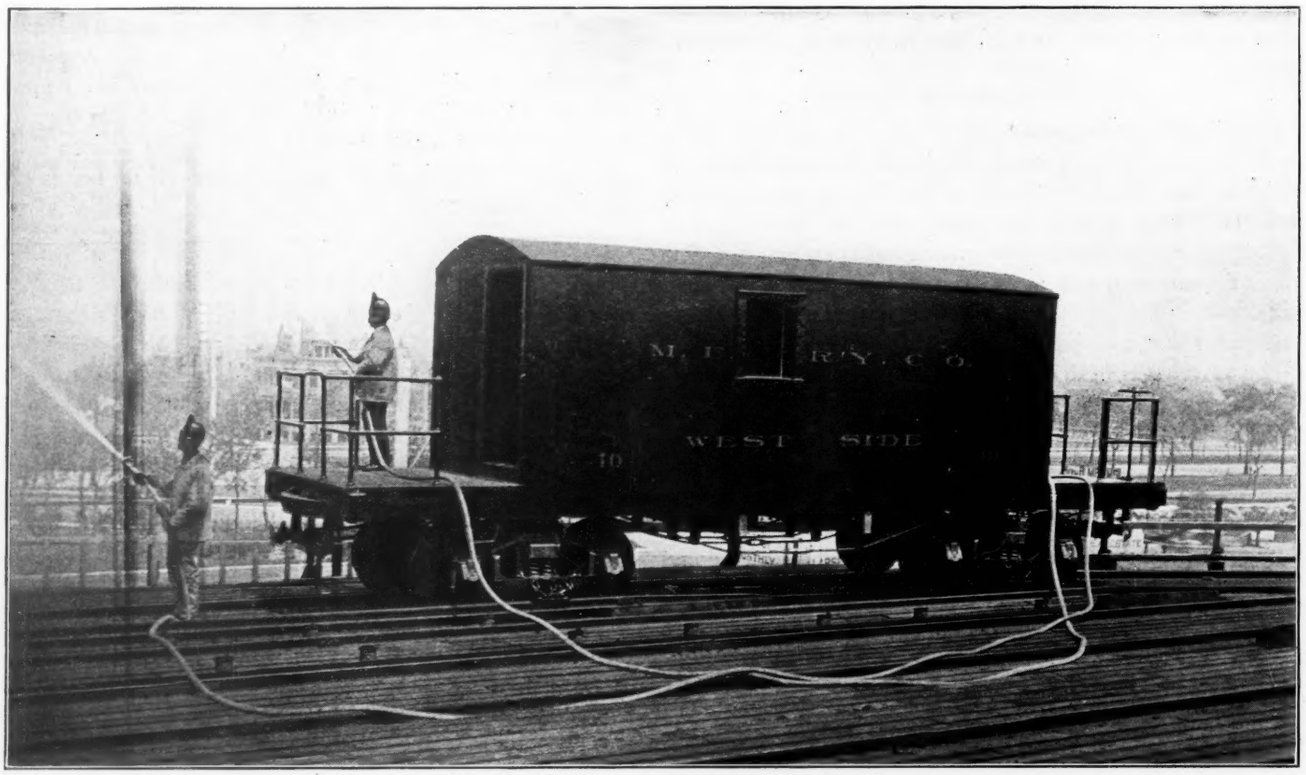
A novel car equipment for fire protection at terminals and yards has recently been installed and tested by the Metropolitan West Side Elevated Railway Company, of Chicago.

It consists essentially of an outfit of chemical extinguishers of large capacity housed in a fireproof car body. The illustration, Fig. 1, conveys the general appearance of the car, which was formerly a coal car, the hopper having been razed down to the deck, and the house built on it as shown, using the original body frame and trucks.

The car is 30 feet long and 8 feet wide ouside. The house is 20 feet long, extends clear across the car, with an inside width of 7 feet 6 inches, and has two doors and two windows, all symmetrically located. The house is covered completely with corrugated iron, and the floor of the 5-foot platform at each end is of ¼-inch steel plate. The entire structure is very strong and intended to withstand the impact of falling bodies. The system of fire extinguisher used is that of the Nott Fire Engine Company, of Minneapolis, which built and installed the apparatus.

In the car, at one side near the end, the two duplicate horizontal pressure tanks are mounted side by side on the floor, and occupy a space 6 feet long by 4 feet 6 inches wide, thus leaving a 3-foot passage by them. The ends of these tanks are seen in Fig. 2. Through the center of each tank from end to end runs a shaft, carrying two paddles, and terminating outside, one end in a crank, also seen in Fig. 2. In the top of each tank near the crank is a large hole closed by a cap, which is screwed down tight with the wrench seen lying on the floor in front of the tanks in Fig. 2. Immediately under this hole the inside shaft and paddles are so bent and shaped as to form a cradle, wherein the acid solder or jar is set and held firmly while the whole shaft is rotated. This rotation of the shaft and paddles spills the acid out of its jar, and at the same time agitates the whole mixture, thus keeping up the pressure during the discharge. The water and the soda are also introduced through this large hole and are well mixed with a few turns of the paddles before putting in the acid jar.

On top of each tank is permanently fastened a heavy wire hose-basket. Each basket holds 150 feet of 1-inch chemical hose, one end of which is coupled to the piping out of the pressure tanks, and the other end has a ½-inch brass nozzle with a shut-off valve. The piping is so arranged as to play either hose or both hose together from either tank, and each hose line has a 250-lb. pressure gauge mounted near its controlling valve.



FIRE EXTINGUISHER CAR ON METROPOLITAN WEST SIDE ELEVATED, CHICAGO

In the opposite corner stands an upright water supply tank, 3 feet 6 inches in diameter, of 250 gallons capacity, mounted high enough off the floor to give a gravity flow into the pressure tanks opposite. The space thus left under this water tank is utilized as a cupboard wherein to stow charges of soda, etc. Fig. 2 shows the edge of the water supply tank at the extreme left, and the ends of the two pressure tanks opposite.

To put the apparatus into operation one man leads out the hose and the other gives the crank a few swings and opens

* Courtesy of *Street Railway Journal*, New York.

the proper valves. But one tank is discharged at a time, the second tank being reserved, to be discharged when the first is exhausted and is being refilled, thus maintaining a continuous stream; a priceless advantage in checking incipient conflagrations.

RECHARGING

As one pressure tank becomes exhausted action in the other is started by turning its crank, and as the pressure rapidly rises the hose lines are cut off from the first one and thrown on it instantly by the valves. The gas is then blown off from the empty tank by a drain valve and pipe, which leads down through the floor, the cap is unscrewed and the empty acid holder lifted out of its cradle and set one side. One of the little canisters holding a charge of

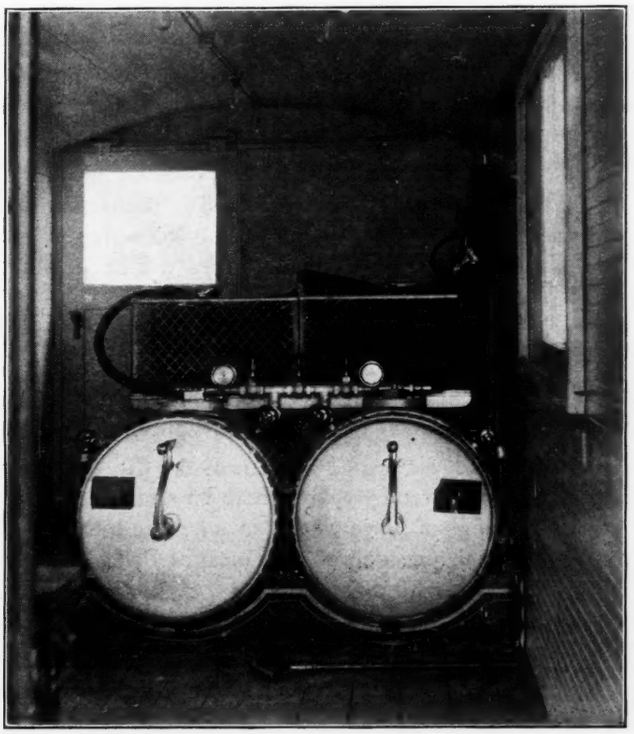


FIG. 2—APPARATUS IN INTERIOR OF CAR

50 lbs. of soda is then emptied into the cap hole, a 3-inch pipe with a gate valve fills up the pressure tank with water from the supply tank in the corner, and after a few turns of the paddle crank to stir the soda solution, the fresh acid holder is set in, the cap screwed on, and that side is ready for business again. One tank will run 7 minutes when supplying both hose lines simultaneously at 150 lbs. pressure, and the recharging of a tank only requires 4 minutes to complete. Fig. 2 shows the cranks, the two pressure tanks, with their piping, hose and baskets, and their cradles and anchor straps. At the left is shown indistinctly the edge of the water supply tank in the corner, which is fitted with a water glass and water in-take. The car is further equipped with two grappling poles, having a chain at the rear end whereby a car may be hauled out of danger. These are carried on hooks on the walls above the windows. Fig. 2 also shows the two axes, two firemen's helmets and two small Babcock hand fire extinguishers.

This car has no motor, and is intended for use at a yard or terminal, where it will be kept upon a short island in the main lead, next to the night despatcher's office, so that any motor car will be instantly available to move it. The Metropolitan Company is building four more similar cars, as this one has been demonstrated to be a great success.

A clear track will be kept through the middle of each yard, and the fire car can be run onto this track and within reach of any car in a yard as soon as it arrives at a yard.

The Camden Fire Department

THE Fire Committee of the City Council of Camden, N. J., upon making their annual inspection of the Fire Department found the houses and apparatus in good condition, the horses well trained and the men alert and active. The department is as efficient as any similar organization of its size in the country.

New Policemen for Rochester

ON the recommendation of Mayor Cutler, of Rochester, N. Y., an ordinance was recently passed providing for an increase of ten men in the Police Department of that city. The increase was to go into effect, probably, July 1, when the appointments would be made from the new eligible lists obtained as the result of the recent civil service examination. It is understood that an ordinance will be drafted by the Corporation Counsel and introduced in the Council creating the position of Deputy Chief of Police.

Fire Commissioners Criticised

THE Fire Commissioners of Hartford, Conn., have been severely criticised by the Aldermen and Council, and a special committee of one Alderman and two Councilmen appointed to investigate the alleged irregularities in the purchase of coal for use in Fire Department engine houses. It was said that the Commissioners neglected to award contracts to the lowest bidder. Councilman Howe stated that nine taxpayers had approached him to have an end put to this "graft business."

Police Collecting Agencies

THE old question of using the Police Department as a collecting agency recently cropped up in Toledo, Ohio. After spending most of the day in attempting to get a warrant for the arrest of a man who owed him money, an anxious individual spent the rest of the day in an effort to prevent its being served. Having got his warrant, it had no sooner been put into the hands of an officer to serve when the man wanted to withdraw it, spending an equally strenuous time in this endeavor.

Neither the police court officials nor members of the department are inclined to look with favor upon those who seek to get their debtors frightened into paying up by securing warrants for their arrest. Prosecutor Meck said: "We ought not to allow them to withdraw a warrant after it has been issued, when they are just trying to make a collecting agency out of this department."

There are numerous cases similar to this and oftentimes complainants have refused to appear against those whose arrests they have secured when a settlement could be obtained outside. This practice is heartily condemned, from the police judge down, but it is a thing which appears to be difficult to get away from.

Increased Protection in Winnipeg

THE increase of about twenty millions to the value of buildings in Winnipeg, Man., during the present year is sufficient warranty for the proposed expenditure of a considerable amount in augmenting the means of protection against fire. The Fire, Water and Light Committee seized with a sense of the danger to which insufficient fire protection exposes this city, have made provision for substantial additions to the fire brigade.

The addition of new fire halls will necessitate the addition of extra equipment, but, in addition to what is necessarily required for these, estimated provision is made for a new aerial ladder of greater altitude than those at present in the city, a water tower and another engine. The cost of these will be under $25,000, which is a modest demand when the enhanced congestion, value and extent of buildings and other property are taken into consideration.

Fire Apparatus for Washington

COMMISSIONER Macfarland, of Washington, D. C., has approved the recommendation of Chief Engineer Wm. T. Belt, that the contract for the combination chemical engine and hose wagon and the fifty-five foot aerial hook and ladder truck be awarded to the American La France Fire Engine Company, of Elmira, N. Y. The bids of this company were $1,800 for the combination engine and hose wagon and $2,275 for the truck. In the contract it will be stipulated that the apparatus shall be completed within 100 days after the execution of the contract, and a penalty of $10 a day will be imposed for every day beyond that time,

The award of the contract for the purchase of a second and a fourth size fire engine will not be awarded until later. But one Independent company, the Nott Fire Engine Company, of Minneapolis, it is stated, submitted a bid on the fire engines. The other bidders, it is said, are in the so-called fire engine trust. The bid of the Nott Company was the lowest received, but as it is a new concern the District authorities desire to test its engines before awarding the contract. If the test is satisfactory, it is presumed that the Nott Company will receive the contract for the fire engines.

Fire and Police Personals

—Chief E. P. Teed has been a member of the Stonington, Conn., Fire Department for forty years.

—Leroy Waller has been named by Mayor Boyd for Chief of Police of Spokane, Wash.

—Superintendent C. H. Patton, of the Cleveland, Ohio, Inspection Bureau, recommends high pressure pumps and mains for that city.

—Chief John H. Espey, of Elmira, N. Y., Fire Department, is said by press, public and firemen to be well qualified for his position.

—Fire Chief George W. Lutz, of Harrisburg, Pa., urges the City Council of that city to bring the fire-fighting equipment up to the standard suggested by the underwriters.

—Fire Chief Jas. W. Viney, of Logansport, Ind., in his annual report praises highly the Eastman new nozzle system, which he says has doubled the efficiency of the department.

—Special interest is taken in a new nozzle, the invention of two Indianapolis firemen, John T. and Peter F. Glazier, the former of whom has been long connected with the fire force.

—Chief of Police W. M. Rea, of Fort Worth, Texas, is president of the City Marshals and Chiefs of Police Union of Texas, and as such will attend the annual convention at Dallas.

—Chief of Police Martin Coffey, of Sacramento, Cal., is not included in the provisions of a recent resolution passed in that city prescribing the standard of physical development for policemen.

—A unanimous vote of thanks to the Chief and Fire Department of Wilmington, Del., recently by the City Council of New Castle, Del., for their services in assisting at a recent fire there.

—Several names have been mentioned in connection with the place of Deputy Chief of Police of Rochester, N. Y., but it is still believed that the authorities will select Major Francis H. Schoeffel.

—Chief Parkhurst, of Somerville, Mass., acting on the advice of the City Solicitor, recently recommended the removal of a patrolman and reserve officer from the force. A committee of Aldermen will hear their appeal.

—Chief of Police Epps G. Knight, of the City of Dallas, Texas, has made every preparation to entertain one of the largest gatherings of peace officers ever held in the State on the occasion of the meeting of the Chiefs of Police Union in Dallas July 5 to 7.

—Former Fire Commissioners Charles E. Billings and George Ulrich were dined by their late associates on the board recently at the Hartford Club. They were presented with beautiful gifts, testifying in outward and visible form to the high esteem in which they are held by the board.

—Fire Chief Mertz, of Akron, Ohio, has made a thorough investigation of the fire-fighting conditions existing in his city. He has tested the capacity of the mains and demands an additional supply of water. He has been trying to bring the abundance-of-pure-water question to an issue for many years.

—Mrs. Almeria S. Tingley, of Waterville, Me., stands a good chance of becoming the Chief of Police in Norwood. The Selectmen who have advertised for a chief have received an application from her, and she has an excellent record for detective work. They have taken her letter under advisement.

—Fire Chief Charles Little, of Rochester, N. Y., recently found himself on the horns of a dilemma when he had to sacrifice the chance of a new fire hose. "Do not," he said to the Aldermen, "understand me to oppose a house in the twentieth ward; I want all the houses and apparatus I can get. But I think there are other parts of the city that need it more."

LITERATURE ON MUNICIPAL TOPICS*

Reviews of Some Important Books—What the Magazines and Reviews Have to Say About Civic Affairs—Municipal Reports Received

Books

IN *The American City; a Problem in Democracy,* Delos F. Wilcox, Ph. D., supplements his book on *The Study of City Government,* by discussing what seems to the author to be the fundamental principles of the American city problem and to point out its real relations to the great problem of human freedom as it is worked out in American political institutions. The questions discussed are under such heads as "Democracy and City Life in America," "The Street," "Control of Public Utilities," "Popular Responsibility," etc. Dr. Wilcox points out in his preface that "for those interested in municipal problems from the standpoint of practical administration, the *Municipal Journal and Engineer* will be found a useful magazine." Cloth, 423 pp., $1.25; postage, 10 cents.

♣

Little Gardens is a discourse of 250 pages, with halftone illustrations, on how to beautify city yards and small country spaces. The book is by Charles M. Skinner, and is a series of hints and suggestions which may be unendingly diversified according to the taste of the reader. The author's idea is to make dusty, weedy city yards bright with the smiles of flowers gracefully arranged. Cloth, 250 pp., $1.25 net; postage, 10 cents.

♣

MR. Fred W. Haglock, C. E., consulting engineer in concrete, stone and steel construction, has written "A Treatise on the Manufacture of Artificial Stone and Concrete." Mr. Haglock's brochure is entitled "Art-Stone," is profusely illustrated and is of interest, if for no other reason, as being the first work on the subject that has apeared. Paper cover, 126 pp.

♣

THE New York City authorities, through the office of the Borough President, have issued the report if its delegate, Professor Ira H. Woolson, adjunct professor Mechanical Engineering, Columbia University, on the International Fire Prevention Congress, which was convened in London in July, 1903. The report is composed of papers presented at the Congress by eminent authorities, and contains valuable information regarding the subject of fire prevention. It will be of interest to Building Bureaus, City Architects and engineers of large buildings.

♣

Elementary Principles of Economics, by Richard T. Ely, Ph. D., LL. D., and George Ray Wicker, Ph. D., while but an expanded definition of economics and a framing of the idea of the nature of the science and of the group of sciences with which it is most closely connected, is none the less a welcome addition to the bibliography of economical science.

The book also contains a brief sketch of economic history, in which the authors point out that even if it were just to regard the subject as but a "bread and butter" science, it would still be worthy of most careful study, for every kind of activity, however sublime, depends to some extent upon material things. Cloth, 388 pp., $1.25 net; 10 cents postage.

♣

A small vest pocket book for engineers is published by the University of Tennessee for the purpose of bringing directly to the attention of the men of affairs of the South the value of technical training in schools and colleges. The book is termed a Manual for Engineers. Leather cover, 240 pp., 50 cents.

♣

Periodicals

The Atlantic Monthly for June contains two articles of interest. In *The Ethics of Taxation* Winthrop M. Daniels points out that "not far from half of the Government's total revenue is obtained by disguising taxes in the prices of merchandise"; and that any reform "will probably come only from a sensibly increased pinch of taxation." Meredith Nicholson writes entertainingly on *Indianapolis, a City of Homes,* historically, socially and industrially considered. Boston, Mass., price per year, $4.

The Chicago Freight Tunnels is an interesting article in *The World To-day* (Chicago) for June, by Rutledge Rutherford, in which he describes the system for the handling of Chicago's city freight in subways, this being the first instance in the world of such a departure. The tunnels are twenty miles in extent, honeycombing the business part of the city, with thorough connections. The capacity of the system will ultimately reach 300,000 tons daily. In the same number is a descriptive article on *Boston's Solution of the Rapid Transit System,* by Fred W. Coburn. Chicago; price per year, $3.

The Special Franchise Tax in New York, by Professor E. R. A. Seligman, in *Review of Reviews,* June, 1904, is discussed with the writer's usual perspecacity. New York; price per year, $2.50.

Advantages of Modern Gas Lighting Over Electricity, by W. H. Booth. *Cassier's Magazine,* New York, May, 1904.

Thawing of Water Service pipes by Electricity (portable wagon outfit at Durango, Col.), by Charles H. Peters. *American Electrician,* New York, May, 1904.

Disposal of City Ashes as an Adjunct of Street Railway Business in Brooklyn. Street Railway Journal, New York, April 23, 1904.

Construction of a Scherzer Double Roller Lift Bridge at Middle Seneca Street, Cleveland, Ohio, by Wm J. Carter. *Journal of Association of Engineering Societies,* March, 1904.

The Construction of the Scherzer Lift Bridge at Newark Bay. Engineering Record, April 2, 1904.

* Any book or periodical reviewed or mentioned in THE MUNICIPAL JOURNAL, or elsewhere, will be sent to any address on receipt of price.

THE MODERN BASCULE BRIDGE

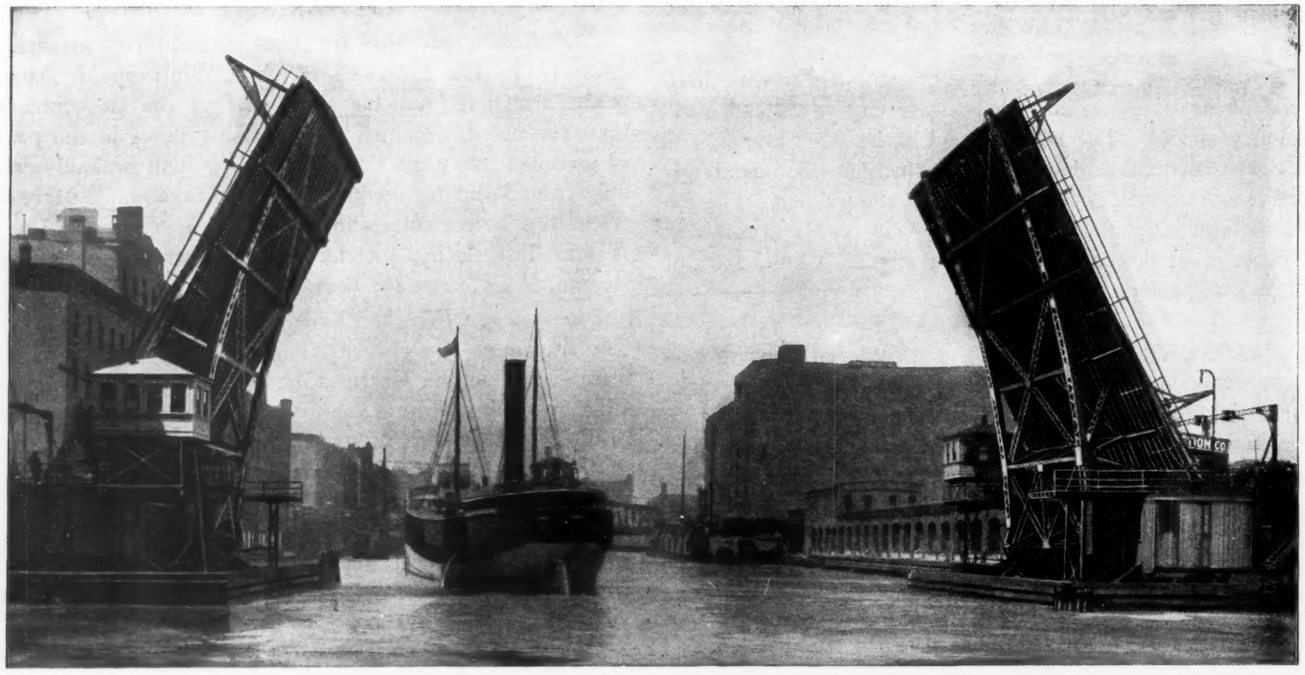
The Scherzer Roller Lift Bridge Has Greatly Improved Harbor Facilities at Chicago, Cleveand, New York and Elsewhere

Every city is vitally interested in the improvement of its transportation facilities, both by land and water. It is the ambition of every progressive city, however small it may be, to improve and develop its facilities for transportation by water, for it is recognized that only those cities which continued to improve and develop their water transportation facilities have attained substantial and permanent prosperity. All of the great cities of the world have water transportation facilities, and are making every effort to improve and develop the same.

The facilities furnished by the Chicago River and its branches have been one of the most important factors in the marvelous growth and development of the city of Chicago from a village, sixty years ago, to a metropolis and one of the principal manufacturing and transportation centers of the world.

As Chicago grew in population, center-pier swing bridges were built at many of the streets crossing the river and its branches. With the growth in size and carrying capacity of the vessels, the center-pier swing bridges became so obstructive to commerce that they not only delayed the passabe of the moderate-sized vessels, but absolutely blocked the large modern lake carriers from entering and navigating the river. It was then decided by the United States Government authorities that no more center-pier swing bridges should be permitted to be built, and the local government authorities decided to remove, as rapidly as it was possible to do so, all of the center-pier swing bridges, and to replace them with the more modern type of bascule bridge. Although many of the center-pier swing bridges were comparatively new, and the replacement of all of them involved the expenditure of large sums of money, it was recognized as absolutely imperative in order to retain the commerce which Chicago had already acquired and to prepare and place Chicago in a position to attract and develop still greater commerce and manufacturing enterprises. Real estate, elevator, warehouse, dock, railroad and shipping interests all united in demanding that the improvements should be made, and the funds were readily provided by public bond issues. The lesson that vessels are independent and free to go to terminals wherever the best facilities are offered was brought home forcibly to Chicago when it saw the large modern vessels barred by artificial obstructions from navigating its harbor, readily finding terminals at other ports.

While many of the center-pier swing bridges at Chicago furnished two channels, each 70 to 90 feet in with, the middle and best part of the river was occupied by long, wide and obstructive protection piers, and the vessel interests preferred the modern bascule bridge, giving a single clear channel 100 feet wide in the middle of the river. Gradually the width of channel provided by the new bascule bridges was increased to 110 and 120 feet, and now the maximum channel called for and provided by the later bridges is 140 feet wide between protections. This channel permits of the rapid passage of the largest lake vessels and is intended to provide not only for the existing total tonnage of Chicago, amounting to approximately 15,000,000 tons annually, but is also considered ample to accommodate all possible increases in size of vessels and total tonnage at Chicago for many years to come. The piers of the new bridges are being placed deep enough so as to dredge the channel of the river to a minimum depth of 30 feet whenever desired.



MODERN SCHERZER ROLLING LIFT BRIDGE, ACROSS CHICAGO RIVER, AT STATE STREET, CHICAGO

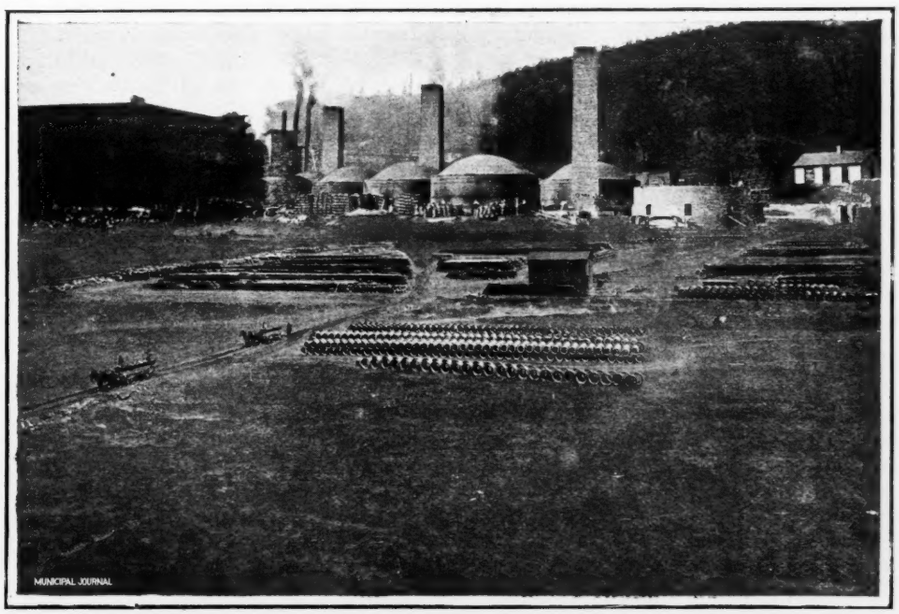
Beginning at the mouth of the river, the center pier swing bridges have already been replaced by modern Scherzer rolling lift bridges at State, Dearborn, Randolph streets, the crossing of the Metropolitan Elevated Railway, Van Buren, Harrison, Polk, Taylor streets, the long-span railroad bridge at the entrance to the Grand Central Station, Eighteenth, Twenty-second, Canal, Main, Throop, Loomis, North Halstead streets, and at the crossing of the eight railroad tracks over the sanitary and ship canal, near Campbell—the largest movable bridge in the world. The accompanying illustration shows the new bridge at State street. It replaced an old center-pier swing bridge, which was extremely obstructive to navigation because of a slight bend in the river near this point.

Want of space prevents the enumeration even of all of the

bridges of this modern and highly successful type constructed and in process of construction, among which are found the largest and most important movable railroad and highway bridges ever constructed. But this account is given for the benefit of city officials, real estate owners, manufacturing, commercial and transportation interests, and to show that there is now no necessity to build bridges which obstruct navigable waterways in the form of center-pier swing bridges, and that substantial progress is being made in the removal of such obstructions, enabling modern vessels to reach cities and obtain and distribute cargoes at many docks and terminals formerly inaccessible. When the center-pier swing bridge obstructions to navigation are all removed, the usefulness and earning capacity of vessels and the value of real estate, manufacturing and commercial property will be greatly enhanced. The cause of municipal art will also receive a great impetus, as the Scherzer bridges can be made as artistic, monumental and beautiful as the famous Alexander III bridge at Paris, and yet be movable so as to accommodate the rapid passage of vessel traffic.

A New Sewer Pipe Company

IN the heart of one of the richest clay districts in the country, Messrs. C. M. and H. E. Stratton, under the name of the Stratton Fire Clay Company, have recently completed one of the largest and best-equipped sewer pipe factories in the world. The plant lies on the outskirts of the town of Empire, O., contiguous to the main tracks of the Cleveland & Pitsburg Railroad. A representative of the MUNICIPAL JOURNAL AND ENGINEER visited the plant and gives the following description:



PLANT OF STRATTON FIRE CLAY COMPANY

"In the way of machinery are found four large pans for grinding the clay. Two are what is known as dry and two wet pans, built by the Stephenson Machine Shop, of Wellsville. There are also two pipe presses made by the same firm, each of which is so built that a 2-inch pipe or a 36-inch pipe can be made, according to the die that is used. The machinery is all driven by a powerful 350-horse-power Buckeye engine built at Salem. To furnish the steam for engine and press and for heating the entire shop for drying the pipe are three 60-inch tubular boilers 16 feet long.

"Through the entire building no pains or expense have been spared to make this an up-to-date modern sewer pipe factory. With other conveniences necessary for such a plant, 16 30-foot circular kilns have been completed, ready when the rest of the factory is ready. It is expected to put out 150 cars per month, or 1,800 cars per annum, each car being about 25 or 30 tons, or in the neighborhood of 50,000 or 60,000 tons. When in full operation the company will employ about 125 men.

"What makes this factory very valuable is the fact that the firm owns about 300 acres of land in connection with it, all of which is underlaid with valuable minerals, such as a 9-foot vein of the best fire clay, from which the works will make pipe. There are also four veins of good coal, running from 3 feet to 5½ feet in thickness. With these advantages utilized as is expected, the company will minimize the cost of the manufacture of sewer pipe.

"These natural advantages at hand, taken together with the fact that the promoters have had 19 years of experience in the sewer pipe and brick business, bespeaks for them in advance success not achieved by the ordinary business firm.

"H. E. Stratton is the general superintendent in the mechanical department, with J. S. Casey as assistant superintendent. The office and business departments are under the supervision of C. M. Stratton, with Prof. Abram Groves, of Empire, as general bookkeeper."

Fire Fighting Machinery

A RECENT visit to the plant of the Seagrave Company, of Columbus, Ohio, developed a remarkable scene of activity and progress. A two-story brick addition is nearing completion, which will add almost 50 per cent. to the capacity of its already extensive buildings. This is the second important addition it has been forced to make since locating in Columbus, about three years ago. New and improved machinery has been installed, and it is now manufacturing almost everything ueed in the construction of the extensive and varied line of fire-fighting apparatus, which this progressive concern is marketing.

Every department is crowded to its utmost capacity. Everything is built to order, and the shipments go to the principal cities and towns in every part of the country. The mechanical skill in construction and the artistic designs in painting and decorating require the highest class of workmen.

"The aerial ladder as built by this company," said a well-known fire chief, "which is hoisted by one man in seven seconds, revolutionized the machine, and put the company prominently in the lead of all competitors."

This company has been allowed patents on an automatic tiller lock for rear-steering gear trucks, which has been thoroughly tested, and expert judges pronounce them the best of the kind ever built, and it expects great things of it hereafter.

There are only a few factories in Columbus whose product wherever seen or used directly and prominently advertise the city of Columbus, and fortunately these have always maintained the highest possible standard. This has attracted here the most capable craftsmen of the country, so there is always an abundance of capable and skilful artisans and mechanics, and the advantage of this condition to the city at large is almost incalculable.

The Wrong Point of View

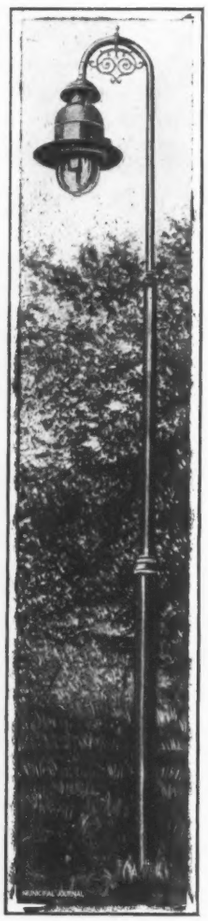
The New Yorker in Chicago catches a whiff of certain strong odors that float over from the stockyards, washing impartially about the walls of hovels and palaces, and shudders with repulsion, forgetful of all the good things that hang, as it were, upon that smell.

Instead of accepting it with fortitude as merely another manifestation of that boundless enterprise that is sowing the tropical jungle and the arctic ice-fields with the tin can of civilization, he is conscious only of a smell—a vile smell.

All the fine, elusive significance of it escapes him. He fails to discern the romance that hangs about it, softening its aggressive actuality as the blue mist does the outlines of the mountains. He does not stop to reflect that the tin can follows the smell, and civilization the tin can. Never having in all his elegant, punctilious existence

been cast away in the white North, or lost in a tropical undergrowth, he fails to realize that there are moments when the sight, even, of one of those discarded cans might be as grateful to a man as it was erstwhile to the Harlem goat.—*From "Back from Chicago," by Frances Wilson, in Four-Track News for July.*

"The Auto-Arc Lamp"



This lamp is the latest production of the Automatic Incandescent Light Company, of Northboro, Mass., and is built on the lines of the 1904 model. It produces a candle-power equal to the electric arc. The lamp and pole are artistic in construction and appearance, thus harmonizing with the views of the progressive city, town and village.

The lamp is connected to a counter-balance weight, the cable to which runs over the gooseneck on pulleys, having a double turn around a roller in the upper part of the larger section of the post. The shaft of this roller extends through the post on one side shaped to receive a crank. The mechanism connected with this counter-balance weight and so carefully adjusted that a crank less than six inches long, which can be carried in the pocket, raises and lowers the lamp with ease, and the lamp will come to rest at any point.

The exterior of the lamp is of oxidized copper, making it not only ornamental, but durable, free from rust, and improving with age. The standard posts are made to suspend the light about thirteen feet from the ground, but this height can be readily increased or decreased.

It is a wonder in convenience and efficiency. It can be filled and lighted with the regular lighting team supplied by the company, or it can be filled and lighted by boys by lowering (the only implement required to gain access to the lamp being the crank carried in the pocket), or it is constructed to be lighted with a small torch supported on the end of a pole the proper length, so that on large installations the lamps can be lighted by boys, each covering a section. There is neither a door to raise, or a valve to turn. Nothing is required but to hold the torch to a fixed point on the lamp for a few seconds.

The progress this company has been making the past year in street lighting business seems to be too rapid to be kept up by it. Within the past three months these lamps have been installed where electric arcs previously did the work, and they are giving universal satisfaction.

Charles River Park, Boston, is now entirely lighted with "Automatic Lamps," and Norumbega Park uses them entirely for "auxiliary" lighting. A number of these lamps are burning on the main thoroughfares in the town of Milford in competition with electric arcs. Groton, Mass., where the sons of President Roosevelt are at school, has just ordered a quantity, and other towns, not only in New England, but West and Southwest, are either partially or wholly lighted by them.

World's Fair Guide Free

The Studebakers have issued an attractive souvenir in connection with their extensive exhibits at the Louisiana Purchase Exposition, St. Louis.

While incidentally picturing a few of the more prominent styles in vehicles, harness and accessories, with accompanying text, which may be seen at their exhibit, the Studebaker souvenir, which is in the form of a railroad folder and of convenient size for the pocket, contains a map of the Exposition grounds, beautifully printed in colors, showing the location of every building and exhibit within the inclosure, and all marked in type easy to read.

The folder also contains a bird's-eye view of the grounds, and a street and railroad map of the city of St. Louis, showing how to get to the fair grounds and to other points of interest in the city.

Those who have seen the maps pronounce them the best to be had, and even better than those sold on the Exposition grounds. Owing to the multiplicity of the buildings and the great extent of ground covered, a good map showing locations is of great benefit to the sightseer, and almost a necessity.

Every intending visitor to St. Louis should take along one of these souvenir guides, which may be had free by addressing Studebaker Bros. Mfg. Co., South Bend, Ind., or calling at their exhibit in the Transportation Building.

The Asphalt Industry Needs Protection

The asphalt industry of the United States must meet peculiar conditions at the present time, and it is purposed to call attention to some of the facts that are of importance to all lines of business.

By far the greatest amount of asphalt used each year comes from the Island of Trinidad and from Venezuela. These asphalts are foreign products which do not pay their proportion of import duty. There are sufficient deposits of asphalt and asphalt base oil developed within the limits of the United States to fill all demands for this material, and there are many millions of dollars invested in its production and marketing. It is not the intention to discuss the relative merits of free trade and protection, but to cite the fact that while other manufacturing interests receive adequate protection, there is an unjust discrimination made in favor of foreign asphalt.

There is no reason for this. Trinidad asphalt is not a satisfactory material for paving, as is shown by the innumerable hole-spotted and badly worn pavements all over the country. Many people in this country have been educated to believe that Trinidad produces all the asphalt. A poor Trinidad asphalt means to them that all asphalt is inherently defective. Venezuelan asphalt must be classed with Trinidad, although infinitely purer (nearly 40 per cent.), as it contains a large percentage of volatile oils and a small amount of organic and mineral impurities.

There never was any reason for declaring that the proper asphalt for paving came from either Trinidad or Venezuela; no selection of material was ever exercised by its promoters. Large deposits of asphalt simply were found. They were advertised extensively and a misguided belief sprang up that these materials were the standard for excellence.

A new era in the industry arose with the development of the asphalt base oil. It then became possible to carry the refining of asphalt to its logical conclusion. Material 100 per cent. pure could be obtained, which had every volatile oil distilled from it. The possibility of producing the perfect asphalt then became apparent. The use of the impure "natural" asphalts had become so general that the early attempts of the asphalt refiners were confined to producing a material "just as good." The great error lay in their not immediately declaring that they were able to produce something different, something that was ready to use and ready to stand the test of all time. The very process necessary for mixing a "natural" asphalt condemns its use. A hard substance, brittle as coal, is mixed with a "residual" oil or "maltha." The resultant product is not a "natural" asphalt, it is the most artificial possible. The "residual" oil dries out and leaves a brittle bitumen containing organic matter, easily dissolved in water, an unelastic asphalt incapable of withstanding the action of freezing, while even the heat of a warm summer day softens its surface so that a boot heel sinks deeply into it.

The successful exploitation of such material as came from the foreign natural deposits was only made possible through the systematized efforts of the most unscrupulous combination that was ever allowed to exist.

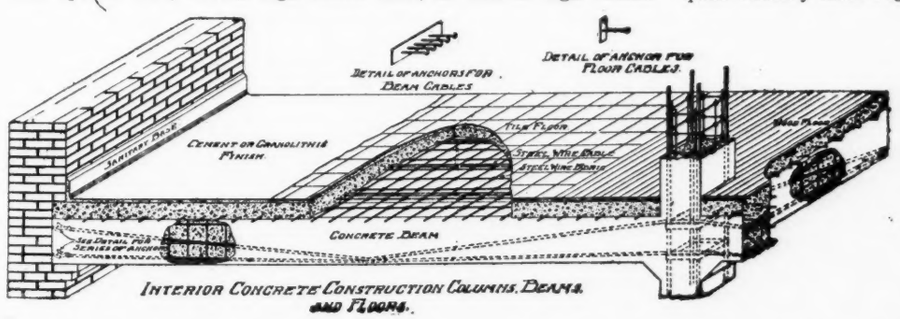
The "graft" employed by the promoters of the foreign asphalt has made business unenviable, and the expose of the formation and

various reorganizations of the "Asphalt Trust" brings to light a series of the most despicable frauds ever perpetrated.

The authority for these statements is interested in the Indian Asphalt Company, of Chicago, and it is not out of place to state that the ideas expressed in this article regarding the proper characteristics for good asphalt are carried out in the manufacture of Indian Asphalt. "In short, we practice what we preach," says Mr. Levering, the president of this company. The asphalt is not "just as dood"; it is "entirely different" from any other asphalt. None of the refineries in the United States find it necessary to ask special privileges, but request the earnest consideration of the business men of the country. A foreign product has been granted a partial monopoly and a popular prejudice created. The facts are easily obtainable. A fair field and a fair test should be allowed.

The "International System" of Fireproofing

"THIS system of fireproofing consists," as described by a well-known western engineer, "of steel wire fabric in combination with steel cable distributing members, both of which are manufactured from special wire, having high elastic limit, as well as high tensile strength. In the floor construction these cables are anchored to the walls or beams and extend to the opposite end of the building, spaced 12 to 24 inches apart, according to the desired carrying capacity of the floors. After drawing the cables reasonably tight, they are then secured to anchors provided for that purpose. Over the cables the steel wire fabric is placed and all imbedded in the lower half of the concrete, thus providing continuous reinforcement throughout the entire floor.



INTERIOR CONCRETE CONSTRUCTION COLUMNS, BEAMS AND FLOORS.

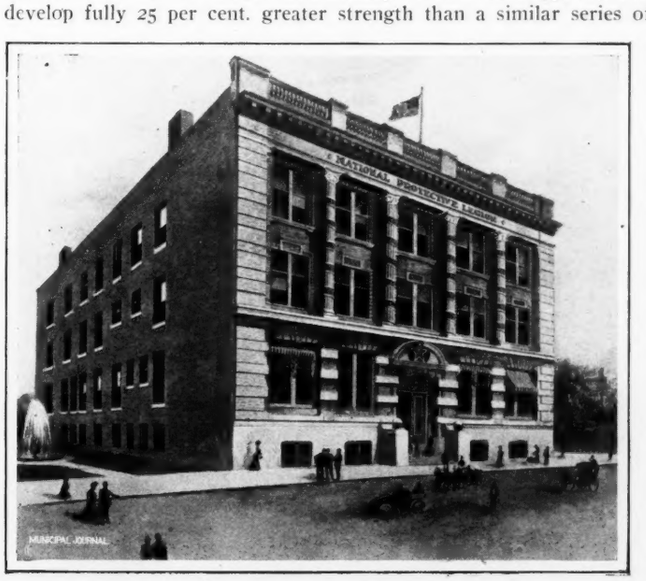
"The numerous advantages of continuous reinforcement over the sectional systems are appreciated by all who have given this matter careful consideration. Especially is this true in entire concrete structures or concrete beam-and-girder construction. It is a fact admitted by all competent concrete steel engineers that a series of concrete beams, reinforced continuously over fixed supports, will develop fully 25 per cent. greater strength than a similar series of beams reinforced by sectional materials. This is also true of flat arch floor construction, whether the supporting beams or girders are of reinforced concrete or of steel. Continuous cables can be placed at much less cost of labor and they entirely eliminate the many disadvantages of rolled or sectional metal.

"As few people understand the method of manufacturing cables as employed by this company, the question of elongation is naturally the first to arise, as ordinary commercial cables never cease to elongate under strain. This is not true of cables manufactured for the sole purpose of reinforcing concrete. The International Fence & Fireproofing Company has designed and is using a machine whereby all its cables are twisted under hydraulic tension, thus producing an initial stress on the wires. These cables are formed with an eye on each end and by this method each wire is stretched tightly in place, making it as stiff and as rigid as a bar, with greater carrying power and the many disadvantages of rods or bars are entirely eliminated.

"The quality of metal used in the manufacture of the 'International' cables and wire fabric is, to a certain degree, accountable for the wonderful success of this popular system. Quality has until quite recently been neglected, in so far as the reinforcing materials are concerned, many engineers taking it for granted that up to a certain limit concrete would elongate with the steel. While this is true, certainly it is far better to use steel which has a very small percentage of elongation within the elastic limit; this will not only produce more rigid work, but beams or girders properly reinforced with such material will show less deflection under a given load than in any other manner.

"The 'ideal' reinforcing material should be well distributed throughout the cross-section and not concentrated in heavy sections at widely distributed points. The fiber stress should be direct, not diagonal, and drawn steel is in every way superior to rolled or cut metal. Neither the cables nor fabric are in any way injured by heat, incidental to welding, either electrically or otherwise."

The accompany illustrations give a good idea of the manner of construction and also of some of the finished work. The tests made upon concrete floor construction and girders in the National Protective Legion Building, at Waverly, N. Y., while of the most severe character were most satisfactory in result. A leaflet giving a full account of the tests and other particulars concerning this system of fireproofing can be had by applying to the International Fence & Fireproofing Company, Columbus, O.



"INTERNATIONAL SYSTEM" USED IN THIS BUILDING

The Anderson Portable Concrete Mixer

THIS machine weighs about 800 pounds, and has a capacity of 40 cubic yards per day of 8 hours. The frame is strong channel iron supported upon three wheels enabling the machine to be easily moved around the work if desired.

The mixing drum is hexagon in shape. It contains no paddles or blades; this enables the machine to be kept perfectly clean when not in use, saving considerable time and expense in cleaning each day before commencing work, as is the case with all mixers containing interior mechanism.

The drum is mounted on hardened steel rollers and is driven by gears properly protected by housings from dirt and grit.

This mixer gives a continuous discharge of properly mixed materials. The dry cement, sand, stone, etc., is measured out in desired proportion, then shoveled into the hopper dry.

The water supply is regulated by the operator and does not come in contact with the material until a thorough dry mixing takes place.

By adjusting the nut on the king bolt on the front wheel the angle of the drum can be changed so that any desired amount of mixing is given the batch before being discharged.

The machine has proven all and more than is claimed for it. It will mix the material for the roughest concrete to the finest top dressing for sidewalk work.

For use where city pressure for water supply is not obtainable, an attachment is furnished for supporting a barrel of water above the mixer at small additional cost.

Full particulars and price list can be secured by applying to W. H. Anderson & Sons, Inc., Detroit, Mich.

Trenton's New Engines and Truck

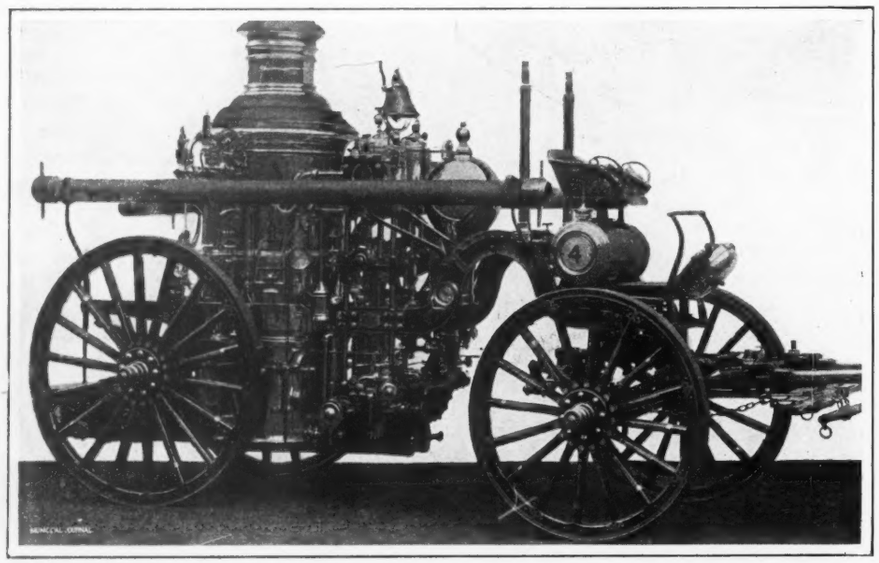
THE fire department of Trenton, N. J., will be considerably strengthened within the next few weeks when three new engines and a truck will be received from the American Fire Engine Company, of New York, which secured the contract some time ago to build one.

Arrangements for a two or three-horse hitch will be upon the truck and engines. It is probable that only two horses will be used to draw the apparatus in the summer, and three, when needed, in the winter.

The truck is to be constructed with due consideration to symmetrical proportions, distribution of the load, and general character of the duty required of it.

It is to be painted in artistic style, including gold leaf and fine striping. The ladders will be done in natural wood and above all the frame will be in white.

The three engines will be what are known as "Size 2, Type 1, H," and they are to have a pumping capacity of several hundred gallons



a minute. They embrace all the latest improvements. Rubber tires will be placed on the three engines, and the truck will be equipped with round-edge, overlapping steel tires.

Bitulithic Pavement in St. Louis

WHEN the city officials of St. Louis began preparations for the Louisiana Purchase Exposition a few years ago, they were conscious that the eyes of the world were upon them; that their city would be visited by millions of people during the progress of the Exposition, and that many thousands, drawn to St. Louis primarily by the exhibition, would make their visit one of profit, and would be on the alert to carry away with them ideas of the best in municipal improvements and conveniences these advantages might be adopted in their own cities.

The conviction that the people of a city are judged by the condition of their streets and sidewalks was one that had taken deep root in the minds of the St. Louis city officials. The problem they had to face in this particular was no light one. With the fixed purpose of obtaining the best for their streets, the officials took up the problem of street paving, ever mindful of the task they had set for themselves.

Naturally the agents of all classes of paving were soon on the ground primed almost to explosion with the alleged good qualities of their own goods and the weakness of those of their competitors. For months the city officials charged with the task of street paving had but little peace. They were besieged day and night with agents, promoters and interested politicians. To all they turned a deaf ear, and concluded to take up the question intelligently and systematically, and by dint of study, perseverance and personal investigation learned to their own satisfaction what was best suited to their needs.

It was during this personal investigation that the merits of the bitulithic pavement first came to their notice. They had learned that the bitulithic pavement had been laid in a number of eastern cities and had given general satisfaction. Inquiries were made concerning it, and letters of uniform praise and predictions of its great future as the coming material for street paving aroused their interest, and a personal investigation was decided upon. Accompanied by the ablest of civil engineers and expert road builders, among whom it must be admitted were some skeptics, visits were made to the cities in which the pavement had been laid, and was in use under all conditions of traffic. The bitulithic pavement not only bore out all that they had heard concerning it, but their own investigations disclosed that it possessed qualities which had not been fully described in the conservative letters they had received from the city engineers and superintendents of streets of the eastern cities in which it had been laid.

The laboratories of the patentees of the bitulithic pavement were inspected and every part of the formula of its construction was intelligently scrutinized, independent tests were made of the cements which were used in the construction of the bitulithic pavement and the most rigid experiments were tried in order to disclose weaknesses, if any there might be.

The result of the investigation was satisfactory, and it was decided to contract for a comparatively small area of the bitulithic pavement, in order to test it under climatic conditions, the experience of St. Louis with certain classes of bituminous pavement not having been entirely satisfactory.

Up to the time of the announcement that a trial was to be given to the bitulithic pavement, the various competing companies had been acting along independent lines, but this announcement united them in a solid phalanx to combat the intruder. Then there followed legal complications which held the attention of the courts for months and resulted in a complete victory for the bitulithic pavement and vindication of the judgment of the St. Louis commissioners, the court handing down a decision which set forth in no unmistakable language that there was no paving company at that time except the Warren Brothers Company which produced a bituminous cement which met the specifications drawn up by the Commissioners of Public Works.

The sample pavement was accordingly laid and subjected to the severest test under every conceivable condition, but the bitulithic showed no perceptible wear and so pleased were the commissioners that additional contracts aggregating nine miles were awarded to the Granite Bituminous Paving Company, the contractors for the bitulithic pavement in St. Louis.

The introduction of the bitulithic pavement in St. Louis met not only with the approval of the Commissioners of Public Works, but also with that of the citizens, and when the question of paving Lindell Boulevard, one of the leading arteries of the city to the Exposition grounds, was under discussion, the taxpayers were unanimously in favor of this pavement. The contract was accordingly awarded to the Granite Bituminous Paving Company, the conditions being that the work must be finished by June 1st. The task was a stupendous one, but the contractors were equal to it, and on June 1st the work was done and the finest boulevard in St. Louis was completed.

The work on Lindell Boulevard, executed by the Granite Bituminous Paving Company, stands as a record in street building, and

may be briefly summarized as follows: Street paved, Lindell Boulevard; Length, 1¾ miles; time consumed in work, 6½ weeks; men employed, 1,000; square yards paving, 60,000; cost, $172,488.80; material, bitulithic.

Street Commissioner Varrelmann, in speaking of the work, expressed himself as greatly pleased, and said it was the finest and fastest paving ever accomplished. Lindell Boulevard will compare in beauty with any boulevard in the world.

The contractors say their work will stand a long time as a record and they call attention to the fact that they had ten days when they could not work.

The following thoroughfares in St. Louis are also paved with Warren's bitulithic: West Pine Boulevard, Grand to Spring; West Pine Boulevard, Spring to Kingshighway; Delmar, Grand to Vandeventer; Delmar, Vandeventer to Taylor; Delmar, Kingshighway to Union; Delmar, Union to Clara; Union, Forest Park Boulevard to Delmar; Maple, Hodiamont to Hamilton; Fair, Algernon to Florisant; Whittier, Easton to Kennerly; Theodosia, Hamilton to Hodiamont; Marcus, Ashland to Easton; Washington street, Kingshighway to Union; Jefferson, Park to Chateau; Jefferson, Park to Lafayette; Hodiamont, Maple to Easton.

Enclosed Automatic Engines

In the past, in the building of outfits for direct-connected electrical service, every engine builder and every generator builder had his own standards for speeds, sizes of units and sizes of shafts. These conditions were not conducive to the best results, as it was necessary for the engine builder and the generator builder to harmonize their differences in standards in directly connecting the engine to the generator. In the year 1901 the American Society of Mechanical Engineers and the American Institute of Electrical Engineers appointed a joint committee to formulate general standards for direct-connected units. This committee in due time made its report, which report is now being followed by the leading engine and generator builders in this country.

The Chandler & Taylor Company, of Indianapolis, Ind., has just published a fine illustrated catalogue descriptive of a line of engines which it builds strictly in accordance with the recommendations of this joint committee as to speeds, sizes of units and sizes of shafts. Therefore, the engine is readily matched with the corresponding size of generator made by any of the generator builders who have adopted the recommendations of the joint committee. This feature greatly facilitates shipment. These engines are built to guage, on the interchangeable plan, and great care has been taken in the design of all the wearing parts. The materials and workmanship are the best obtainable, and every engine is thoroughly tested under steam.

The technical description has been purposely avoided in this catalogue and, therefore, it is one which will be readily understood by all laymen, so that it will be particularly valuable to such members of the city governments as may not have a technical knowledge of the subject and yet are expected to pass in judgment upon it.

The Improved Street Cleaning Machine

The International Sanitary Street Cleaning Company, Hartford, Conn., is putting on the market a machine for which the following claims are made:

First. The machine is capable of doing the combined work of sprinkling, sweeping and collecting the dirt from a width of six feet of pavement.

Second. It does this without noise and dust. The sprinkling is graduated to suit the needs of the street, while the elevator which carries the dirt into the bin is covered, which prevents the escape of any dust.

Third. It is operated with ease and under the absolute control of the driver, if horses are used, or motorman, if gasoline motor is employed.

Fourth. The dirt is automatically discharged into the attending cart, so that there is no necessity for the driver or motorman leaving his seat to attend to this simple matter, with the additional advantage that no offensive deposits are made on the streets.

Fifth. The machine will sprinkle, sweep and collect the dirt from 8,000 to 10,000 square yards of pavement per hour under ordinary rate of traveling team or motive power.

Sixth. It is especially claimed that the machine is absolutely sanitary and dustless. It is readily self-adjusting to all reasonable variations of street surface, the broom being flexibly hung to the elevator and rests on separate set of trailer wheels, where it is held firmly to the surface, producing the best possible results.

Seventh. No capital investment risk whatever is incurred by either the municipality or contractors in adopting this modern, sanitary and scientific system of cleaning streets, as the machines are only rented, or leased, by the year or term of years. By this plan of doing business the company assumes the investment risk, if any, and the city or contractor begins at once to save money without being required to invest in a new plant, as the machines are never sold. A complete description, with illustrations of the machine, can be had by addressnig the company at Hartford.

Publications Received

—The "General Catalogue" (illustrated) issued by the Buffalo Forge Company, Buffalo, New York, measures 4x4½ inches and has 400 pages. It is most complete in its classification and arrangement and has what every large catalogue should have—a properly constructed index which enables one to consult it without loss of time in fumbling over a lot of pages to find one thing that is desired. If you know what you want, turn to the index and you can locate the thing without a moment's loss of time. On the other hand, if you don't know what you want you will learn something to your advantage if you look through the pages carefully. It is a first-class catalogue for city officials to have on file, particularly heads of departments. Send for it.

—"A Cooling Breeze" is the title of an attractive little folder just issued by the Ewing-Merkle Electric Co., 1108 Pine street, St. Louis, Mo., which tells you how you can keep cool during the hot summer months. The same concern has issued a vest-pocket guide to the World's Fair, which will be sent to any address free of charge.

—The Nernst Lamp Company, of Pittsburg, Pa., has recently issued a small folder with cover and text printed in colors, which contains a lot of information that will be of use to those interested in the lighting problem. Its theme is, "The Value and Utility of the Nernst Lamp to the Central Station." It talks convincingly about the quality, uniformity, efficiency, simplicity of maintenance, etc., etc., of the lamp. A postal card request will bring you a copy of the booklet.

—"The Porcupine: A Road Scarifier," is the title of a handsome illustrated bulletin recently issued by Julian School & Co., 126 Liberty street, New York. The text contains a lot of useful facts and the illustrations clinch the argument advanced to show the merits of the machine.

—"The Acme Water Storage System" is the title of a small booklet published by the Acme Water Storage and Construction Company, Park Row Building, New York City. It describes its method for the effective and economical storage and distribution of water in small towns, suburban establishments, grounds and dwellings.

—The "First 1904 Edition" of the catalogue of The Ingersoll-Sergeant Drill Company, 26 Cortlandt street, New York, tells all about air compressors for all duties and pressures as made by this company.

—All towns and cities are interested in street lighting and therefore will be interested in the new catalogue, recently issued, of The Sun Vapor Street Light Company of Canton, Ohio. The catalogue

is well illustrated and contains a price-list of the principal products of the concern. It is a good catalogue to have on file.

—The Best Street Lighting Company, 72 East Fifth street, Canton, Ohio, in catalogue No. 36, which has forty-four illustrated pages with cover, gives prices and descriptions of its products which include, among other appliances, all kinds of lamps for lighting streets, parks, avenues, etc., etc. A copy can be had for the asking.

—The Kahn System of Reinforced Concrete, patented, is fully described and profusely illustrated in "General Catalogue C.," recently issued by The Trussed Concrete-Steel Company, Union Trust Building, Detroit, Mich.

"Recent Endorsements for Asphalt Block" is the title of a small leaflet issued by The Lake Erie Asphalt Block Company, Toledo, O. It will not fail to interest city engineers, aldermen and mayors.

—The catalogues recently issued by The William Tod Company, of Youngstown, O., tell interesting stories about the blowing engines, Corliss engines, reversing engines, automatic engines for rolling mill and electric power service which it builds. If you are at all interested in the subject you will be glad to have these catalogues.

Items of Interest About the Trade

—The Haywood Wagon Company, of Baldwinsville, N. Y., reports inquiries for garbage, ash, bottom dumping, stone-spreading and asphalt wagons from contractors and municipalities from several eastern and western States. An order for several contractors' wagons for use on Long Island was recently delivered. This company, though formed only a year ago, has already begun to build up a good business in dumping wagons and its reputation is now widely established.

—The Pennsylvania Railroad Company recently awarded a contract for the cement which will be used in the construction of its tunnel from Weehawken to Long Island City and in the terminal stations and power houses connected therewith. The contract was secured by the American Cement Company of Philadelphia through its New York Branch, the United Building Material Company. This will doubtless prove to be the largest contract for Portland cement ever awarded. The largest contract previously awarded was that for 1,500,000 barrels for use on the New York Subway, which was likewise "Giant" cement, furnished by the same company.

—The C. O. Bartlett & Snow Company, Cleveland, O., recently received an order from the United States Geological Survey for one of its No. 3, style "C," four-compartment direct-heat rotary dryers to be used in the plant installed within the Exposition grounds of the World's Fair at St. Louis, for testing the coals and lignites of the United States. It is reported that some of the large railroads, together with this department of the Exposition, are erecting quite an extensive plant under the direction of the United States Geological Survey for the purpose of demonstrating the most economical methods for utilizing coals, especially the lignite coals of Montana, the Dakotas ad other western States. This plant will be under the direction of E. W. Parker, J. A. Holmes and M. R. Campbell, and will be the first of the kind ever authorized by the Federal Government. The work of this plant will be of great value to all producers and users of coal.

—The well-known technical advertising man, Ray D. Lillibridge, of 170 Broadway, New York, recently produced an attractive wall map of the "S. K. C. System of Long-Distance Transmission in California" for the Stanley Electric Mfg. Company, of Pittsfield, Mass.

—Mr. Paul M. Mowrey, who for the last three years has been connected with the Merchants' Trust Company as adviser on industrial investments, has assumed the office of vice-president of the Engineering Company of America, 74 Broadway. Mr. Mowrey has been prominently identified with the engineering and contracting business since 1888, when he became connected with the Edison Illuminating Company. Among his numerous successful enterprises was the purchase and consolidation of the Street Railway and Power Companies of Richmond, Va., which were later turned over to Frank Jay Gould.

English Cities Profit from Municipal Ownership

Every year Mr. James Carter, borough engineer of Peston, Eng., compiles some tables showing the progress of municipal ownership in English cities and boroughs and how the majority of them are operating various public utilities, the profits from which materially reduce the taxes. The tables for 1903 deal with sixty-six municipalities and show the profits from markets, gas and electric lighting, water, tramways, revenues from estates, etc., and the amount in the pound by which rates are reduced in consequence of the transfer to the general, district or other fund of the total profits. These municipalities made an aggregate profit of $5,096,545 from their undertakings; only one, Blackburn, showing a small deficit.

Great Britain is the home of municipal trading. From a return presented to the House of Lords recently one may obtain a statistical survey of the extent and the financial results of this movement. It appears that 193 boroughs own water works, ninety-seven own gas works, 102 own electric plants, forty-five own tramways, but twenty-nine of these lease them out to companies. Markets are owned by 228 boroughs, baths and washhouses by 138, burial grounds by 143, working-class dwellings by twenty-four and harbor improvements by forty-three. In all these, and a few other branches of municipal enterprise there has been an investment of $605,860,000. The financial result of the operations is a surplus of about $1,891,405. This, of course, is not a test of the success or failure of the experiments. The charge for interest is only about 2 per cent. and the amount annually written off for depreciation is less than 1 per cent. On the other hand, the public receives advantages which might not be obtainable if it were not for these municipal enterprises.

Glasgow, as all the world knows, takes the lead in municipal trading. It is the boast of Glasgow that it takes care of the citizens from the cradle to the grave. The municipal corporation supplies Glasgow with water, gas, electric light, transportation and telephones. It also provides baths, washhouses, slaughter houses, burying ground, shops, houses, warehouses, theatre, churches, hotels, golf links, and a bake house.

Most of these are rented out by the city. Glasgow farms over 1,000 acres of land, raises large crops, utilizes its sewerage for manure, operates quarries, builds cars, and has 900 railway wagons delivering freight.

There is a current fiction that on account of these many enterprises the citizen of Glasgow practically escapes taxation. This is an error. The revenue of Glasgow in 1901 was about $14,045,000, whereas its expenditures were $14,230,000. Here was a deficit of $185,000. Besides the city had a capital outlay in that year of $8,385,000. Thus in all its current receipts fell over nine millions short of its expenditures. The most startling feature of Glasgow's experience is the growth of its debt. Ten years ago Glasgow owed $27,240,000. Its debt now is $64,385,000. In the same time the rates of municipal taxation have nearly doubled.

CONTRACT NEWS FOR THE MONTH

Including Paving, Sewerage, Water Supply, Lighting, Public Buildings, Sewage and Garbage Disposal, Fire Supplies, Contracts Awarded

N. B.—All news of proposed work sent us by city officials is incorporated in our Weekly Advance News Service and appears subsequently in this "Contract News for the Month" if the date of the reception of bids be sufficiently late to warrant placing the item here.

City officials and others are urged to send us all news of contemplated improvements for use in our Weekly Bulletins which are mailed to those interested.

PAVING, PAVING MATERIALS AND MACHINERY

Albany, N. Y.—Will pave Washington avenue, Division, Herkimer and Franklin streets. Clerk Common Council.

Barrie, Ont.—Will spend $10,000 in extension of cement sidewalks. E. Donnell, City Clerk.

Bayonne, N. J.—Will improve two streets. W. C. Hamilton, City Clerk.

Binghamton, N. Y.—Will appropriate $15,000 for street improvements.

Birmingham, Ala.—Will pave and macadamize streets and construct sidewalks. Mayor Drennen.

Buffalo, N. Y.—May open streets and avenue. Street Commissioner.

Camden, N. J.—Will pave several streets. H. C. Kramer, City Clerk.

Cincinnati, O.—Will pave and improve streets and avenues and construct sidewalks. Edwin Henderson, Clerk Council.

Cortland, N. Y.—Will pave Elm street.

Dayton, O.—Will pave and improve streets and avenues. City Engr., Turner; Calvin D. Wright, President City Council.

Delano, Minn.—Voted street improvement bonds.

Erie, Pa.—Will pave poplar street and others.

Harrisburg, Pa.—Ordinance introduced for paving Front street.

London, Ont.—Will lay ten miles of concrete sidewalks this year. C. B. Edwards, City Clerk.

Philadelphia, Pa.—Will construct public squares.

Rochester, N. Y.—May pave and improve many streets.

Springfield, Mass.—Will pave Boulevard and Berkshire street. City Forester, William F. Gale.

Toledo, O.—Will pave and repave a number of streets. Charles H. Nauts, City Clerk.

Albany, N. Y.—Bids wanted for macadamizing and improving Lancaster street; will repave Pearl street with asphalt block.

Birmingham, Ala.—Will macadamize and improve streets.

Chester, Pa.—Will improve streets and avenues. City Council.

Elmwood Place, O.—Will improve Prosser avenue, H. G. Schafer, Clerk.

Grand Rapids, Mich.—Petitions received for paving North Prospect street.

Jersey City, N. J.—Sale of $150,000 bonds for improvement of Paterson Plank Road. John P. Egan, Clerk.

Lodi, N. J.—Will widen Union street. The Mayor.

Minneapolis, Minn.—Will pave several streets. J. C. Haynes, Mayor.

New Orleans, La.—Will asphalt St. Charles avenue.

Pittsburg, Pa.—Many street improvement ordinances passed. Common Council.

Portland, Me.—Will construct several brick sidewalks.

Rochester, N. Y.—County of Monroe will improve many roads. County Engr. McClintock.

Saginaw, Mich.—Will asphalt Michigan avenue. Will lay many sidewalks. W. H. Barton, City Clerk.

San Francisco, Cal.—Will probably repave many streets.

Akron, O.—Bonds have been sold for roadway in Perkins Park.

Albany, N. Y.—Will probably pave five streets. Frederick M. Bresler, Clerk Common Council.

Amsterdam, N. Y.—Bids, July 5, for 8,400 square yards of brick block pavement. F. E. Crane, City Engr.

Baltimore, Md.—Will widen Light street. Proposed to widen other streets and spaces. Burnt District Com.

Binghamton, N. Y.—Specifications will be drawn for brick pavement for Susquehanna street.

Camden, N. J.—Bids, July 11, for macadamizing road. Road Com., Jail Bldg.

Chester, Pa.—To pave Chester street with sheet asphaltum.

Cincinnati, O.—Bids, July 12, for paving (brick) Ninth street. G. F. Holmes, Clerk.

Cleveland, O.—May construct boulevard to connect parks. Bd. Pub. Services.

Covington, Ky.—Will improve several streets. F. C. Niemeyer, Supt. Pub. Works.

Duluth, Minn.—Will improve nine blocks on London Road. City Council.

Greenfield, Mass.—County Commissioners want a new road.

Hamilton, O.—Bids will be asked for paving nine streets and avenues. Bd. Pub. Services.

Indianapolis, Ind.—Plans approved for Fall Creek boulevard. Will pave two streets (brick).

Kansas City, Mo.—May construct boulevard. Park Bd. Rosedale village may advertise for bids for brick pavements. Rosedale Council.

Louisville, Ky.—Will vote soon on $3,500,000 bond issue for street and sewer improvement. Mayor Grainger.

Lynn, Mass.—Considering the extension of Central avenue. The Mayor.

McKeesport, Pa.—Will improve Walnut street.

Marion, Ind.—Bids, July 5, for improving several streets. C. G. Robbins, Clerk.

Minneapolis, Minn.—Mayor will sign contract for paving Third avenue, with Republic Creosoting Company.

New Bedford, Mass.—$49,000 appropriated for streets and highways. Bd. Aldermen.

New Brunswick, N. J.—Will pave an avenue.

Oakland, Cal.—Will improve Telegraph avenue.

Ottawa, O.—Bids, July 22, for $45,000 bonds. County Comrs., Putnam Co.

Passaic, N. J.—Will open Pine street.

Racine, Wis.—Will extend Herrick avenue. H. J. Schroff, City Clerk.

Rochester, N. Y.—May complete Genesee Park Boulevard. Park Board.

Rome, N. Y.—Will prepare plans for asphalting W. Court street.

St. Joseph, Mo.—Will pave Twentieth street with vitrified brick. Bd. Pub. Works.

St. Paul, Minn.—May pave Boulevard and University avenue.

Scranton, Pa.—Will pave Washburn street with vitrified brick. May pave Capouse avenue. City Council.

Selma, Ala.—Will purchase rock crusher.

Springfield, Mass.—Plans nearly completed for proposed boulevard. Bd. Pub. Works.

Spokane, Wash.—Will probably widen Sprague avenue. Will pave Second street.

Superior, Wis.—Will repave street and alley. C. N. O'Hare, Mayor.

Syracuse, N. Y.—Sold $272,000 bonds.

Tacoma, Wash.—Will improve two streets. L. J. Pearson, Clerk.

Terre Haute, Ind.—May appropriate $7,000 for street intersections. Bd. Pub. Works.

Toledo, O.—Will pave three streets. Chas. H. Nauts, City Clerk. Will also build stone and artificial stone sidewalks. Bids, July 11, for paving Bancroft street.

Washington, D. C.—Will extend Fourteenth street.

CONTRACTS AWARDED.

Akron, O.—Contract for paving Rose street awarded to Hallinan Bros.

Albany, N. Y.—Contracts let: For Scoharie road to Albany Material & Construction Company, at $38,749; Delaware turnpike to J. T. Finch, Glens Falls, at $74,985; Schenectady and Albany road to Buckley Construction Company, Schenectady, at $25,690; E. Mohawk turnpike to Buckley Construction Company, at $23,500; Middletown State road, to M. Luddington, Rochester, at $13,115.20; Slate Hill Unionville road to Orange County Road Construction Company, at $45.200; Newburgh-Shawangunk, to Orange County Road Construction Company, at $48,250; Oneonta road to Joseph Walker, Mariners' Harbor, at $10,528; Broadway Ft. Hunter road, to Anderson & Britton, Rochester, at $13,437; Penfield road to H. P. Burgard, Buffalo, at $30,500; Dugway road to Chambers & Grady, Rochester, at $18,272; Dugway road, section 3, to Mosier & Summers, Buffalo, at $13,400; Lake road to H. C. Schroeder, Rochester, at $13,400; Endicott road to County of Broome, at $19,900; Chenango Towpath road, to County of Broome at $9,998.50.

Butte, Mont.—Contract for grading Mercury street let to Jesse Huddleston, at 27 cents per cubic foot.

Covington, Ky.—Contract for improvement of Scott street let to Evan Evans at $32,000. Contract for improvement of Hermes avenue let to Peter Ader. Contract for improvement of Greenup street sidewalks let to Thos. Avens.

Des Moines, Ia.—Contracts for paving two alleys with brick let to King-Lambert Construction Company at $1.60⅜ and $1.68⅜.

Grand Rapids, Mich.—Contracts for paving Pearl alley let to John H. Sullivan at $1,258.42; for Union street, with asphalt block, to Kloote Van der Veen at $14,380.

Harrisburg, Pa.—Contract for paving Blackberry avenue let to Geo. E. Stucker; for paving Fifteenth Street let to Warner-Quinlan Company.

Hoboken, N. J.—Contract for cement sidewalks let to H. A. Sullivan, Jr.

Jersey City, N. J.—Contracts for paving Fairmont and Clendenny avenues let to Peter E. McCabe; for improvement of Bay street let to A. A. Van Winkle; for repaving Wayne street let to Philip Tumulty; for improvement of Spruce street let to Bernard Gannon.

Kansas City, Mo.—Contracts for paving Prospect, Seventh, Twenty-first, Spruce and Harrison streets let to Parker-Washington Company.

Kearney, N. J.—Contract for paving Forest street let to D. Dunn, Jr. ,at $1,052.30; for paving Beach street let to P. M. & J. F. Shanley.

Leavenworth, Kas.—Contract for paving Congress, Fifth, Michigan, Arch and Pottawatomie streets and Second avenue let to Chapin & Greever at $1.47 per square yard.

Montclair, N. J.—Contract for hard roads, section 1, let to Osborn & Marcelles; for same, sections 2, 3 and 4, let to Francisco Bros.

New Britain, Conn.—Contracts for flag walks for the season at 92½ cents per lineal foot, and for Belgian block at $86.00 per 1,000, let to L. C. Baker & Company; for crosswalks, at $2.25 per running foot, let to Thos. C. Smith.

Richmond, Va.—Contract for asphalt block paving on East Grace and Franklin streets let to Washington Asphalt Brick & Tile Company at $2.30 per square yard.

Rochester, N. Y.—Contract for street paving let to Rock Asphalt Company at $4,045.51; for sidewalks on avenue A, Russle and Anna streets let to Herman Miller at $617, $703.50; and $139, respectively.

Saginaw, Mich.—Contract for paving Johnson street let to Cleveland Trinidad Paving Company.

St. Paul, Minn.—Contract for repairs on two roads let to D. C. Campbell and George H. Gerlick, Sr.

Springfield, O.—Contract for paving Lagonda avenue and Locust street let to Edward Ryan at $74,653.53 and $4,190.70, respectively; for paving Highland avenue let to Wm. F. Payne at $4,867.21.

Utica, N. Y.—Contract for paving streets let to Interstate Paving Company.

Warren, O.—Contract for road building let to N. Mango & Company, Niles, O., at $26,326.

West Hoboken, N. J.—Contract for Charles street paving let to Cullery & Murphy.

Albany, N. Y.—Contracts let: Gorham-Stanley road, to J. T. Finch, Glen Falls, at $17,750; Geneva-Canandaigua road, H. P. Burgard, Buffalo, at $47,500; Ninevah road, to County of Broome, at $6,814; Harpersville road, to County of Broome, at $10,117; Center village road, to County of Broome, at $4,749; River road, Windsor, sections 1 and 2, to County of Broome, at $12,794 and $22,999; Dryden road, to F. Pidgeon, Saugerties, at $14,539; Roxbury road, to Simpson Bros., Phœnicia, at $7,934; Grand Gorge road, to S. B. Van Wagoner, Roundout, at $6,990; Cherry Valley-Richfield Springs road, to D. B. Joselyn, at $6,371; Worcester road, to S. B. Van Wagoner, Roundout, at $8,990; Edmeston road, to A. Schaupp, Albany, at $5,970; Hughsonville road, to F. Pidgeon, Saugerties, at $23,649; Oxford-McDonough road, to C. H. Quereau, Baldwinsville, at $34,191; Guilford road, to Chambers & Grady, Rochester; at $43,378; Adams-Henderson road, to Chambers & Grady, at $10,606; Pierrepont-Manor-Ellisburg road, to Casey & Murray, Rochester, at $18,000.

Jacksonville, Fla.—Contract for five miles of shell roads let to J. D. Smith at $19,580.

Rochester, N. Y.—Contract for paving Trinidad street let to Clark Asphalt Company at $4,045.15; Sellinger street to Rochester Vulcanite Pavement Company at $9,297.50; Niagara street (brick) to F. A. Brotsch at $10,994.

WATER SUPPLY

Batavia, N. Y.—Will lay water mains.

Batesburg, S. C.—Voted bonds for water works. The Mayor.

Battle Creek, Mich.—Will filter Lake Cognac. Allen Hazen, 220 Broadway, New York City, Consulting Engr.

Bishopsville, S. C.—Bonds for water works voted. The Mayor.

Buffalo, N. Y.—Bids will be asked for pipe line for fire boats. Larger mains recommended. Mayor Knight.

Camden, N. J.—Will sell $200,000 water bonds. H. C. Kramer, City Clerk.

Columbia, N. C.—Considering "pure" and "common" water supply. Thornwall McMaster.

Duluth, Minn.—Will extend water mains. To issue bonds for new reservoir. City Council.

Kingman, Kas.—Voted $25,000 bonds for water works.

Madrid, Ia.—Expect to install water works soon. Mayor Lawbaugh.

Manchester, Va.—Considering complete new water works. Water Supt. Sharp.

Morton, Ill.—Will let contract for water main extensions in July.

Murphy, N. C.—Considering water works. The Mayor.

Norfolk, Va.—To lay 30-inch water main from city limits to water works. Mayor Riddick.

Peru, Ind.—Wants prices on cast iron water pipe. William O'Hara, City Clerk.

Reading, Pa.—Will lay a water main on Twelfth street.

Ridgeville, Ind.—Will improve water works. C. E. Barrett, President Town Board.

Rutland, Vt.—Considering purifying water supply. The Mayor.

St. Paul, Minn.—Will lay 4,900 feet of water mains. Water Board.

Seneca Falls, N. Y.—Considering system of water works.

Sibley, Ia.—Will let contract in July for 3,300 feet 4-inch water mains, hydrants, etc.

Summerside, Prince Edward Island, Can.—Wants information regarding establishing water works. The Mayor.

Toledo, O.—May issue bonds for pure water supply. Board Pub. Service.

Urbana, Ill.—Will spend $4,000 on water mains. J. A. Glover, Mayor.

West Union, Ia.—Will lay 3,500 feet of 4-inch water mains.

Wilmington, N. C.—Appropriation made for water works.

Yazoo City, Miss.—Will enlarge water works. The Mayor.

Angona, Ia.—$6,000 may be spent on water works.

Barrie, Ont.—Water works system to be extended. $3,000 appropriated.

Bordentown, N. J.—May install new water plant. Common Council.

Carrollton, Ga.—Will issue water works bonds. The Mayor.

Casey, Ill.—Considering a water supply.

Cincinnati, O.—New bids wanted for steel and cast-iron mains.

Clarksville, Tex.—To plan water works system.

Cleveland, O.—Chamber of Commerce recommends high-pressure pumps and mains.

College Park, Ga.—Considering water works.

Delphi, Ind.—Thinks of increasing water supply.

El Dorado, Ark.—Has planned water works system. W. M. Van Hook, Mayor.

Galveston, Tex.—Plans for new water works accepted.

Gloucester, Mass.—$94,000 appropriated for water works.

Greenfield, Ind.—Movement begun for a large reservoir. Board of Health.

Indiana, Pa.—Bids wanted for two miles of 10-inch cast-iron water pipe. Clymer Water Company.

Janesville, Minn.—Voted to issue water works bonds.

Kansas City, Mo.—Has appropriated $10,000 for submerging water mains. Unsold bonds include $600,000 for improvement of water works.

Luverne, Ala.—Will construct water works.

Marion, Ind.—Bids, July 29, for improving water plant and supply. J. Q. Adams, Treasurer, National Military Home.

Mexico City, Mex.—Wants congress to appropriate $2,500,000 for increasing water supply.

Minneapolis, Minn.—To extend water mains. J. C. Haynes, Mayor.

Montreal, Que.—Following amounts appropriated: Mains, $24,000; service pipes, $20,000; three boilers, $15,000; steam pump, $75,000; meters, $4,500; cementing part of reservoir, $25,000; improving intake, $6,500.

Pella, Ia.—5,000 feet new water mains to be installed. D. T. Huber, Mayor.

Pleasant Grove, Utah—Plans for water works drawn.

Portage la Prairie, Can.—Tenders wanted for water works.

Port Townsend, Wash.—Considering water works.

Ridgely, Md.—Will establish water works.

Saginaw, Mich.—To lay water main in Hanchett street.

St. Charles, Ill.—Ordinance for construction of $50,000 water works.

Savannah, Mo.—Considering water works. J. R. Williams, Mayor.

Springfield, Mass.—Water Commission recommends new 600,000,000-gallon reservoir, single filtration plant and water system. City Council.

Walla Walla, Wash.—Will buy 7,000 feet water pipes.

Westernport, Md.—Contemplate water works. Charles Towry, Mayor.

Akron, O.—Water company may enlarge present mains. Considering municipal water plant.

Alliance, O.—Will have improved water supply and will extend mains.

Atlantic City, N. J.—Water department wants appropriations for 9,000 feet of 8, 10 and 12-inch water main; 12,000 feet of 8 and 10-inch high-pressure fire mains; two concrete reservoirs and 3,600 feet of 30-inch main.

Barrie, Ont., Can.—Voted $18,000 bond issue for water works improvements.

Batesburg, S. C.—Water works bonds voted.

Belgrade, Mont.—Considering water system.

Bishopville, S. C.—Voted $20,000 water works bond issue.

Bristol, Tenn.—Considering a $500,000 water supply system.

Burlington, N. J.—May filter river water. The Mayor.

Cambridge, Mass.—To recommend appropriation of $250,000 to begin first section of pipe line from Hubbs Brook to Fresh Pond.

Chickasha, Ind. Ter—Will erect a new water works plant.

Clare, Mich.—Will let water works system contract about September 1. A. J. Lacy, Mayor.

Cranbury, N. J.—Will have a town water system. Cranbury Fire Company.

Crooksville, Ohio—Board of Trade raising funds for water works.

Detroit, Mich.—Bids, July 6, for $100,000 water bonds. F. Guiney, Secretary Water Com.

Eldorado, Kan.—May install a water system. The Mayor.

Grand Island, Neb.—Bids, July 6, for 2,000,000-gallon steam pump. Edw. Hooper, City Clerk.

Grand Rapids, Mich.—Considering placing meters on all water service.

Hancock, Minn.—May install $10,000 water system.

Harrisburg, Pa.—Will lay water mains in several streets.

Kansas City, Mo.—A 25,000,000-gallon pump will be placed at the Quindaro pumping station. Will sell $600,000 more water bonds.

Leesburg, Va.—Will vote, July 9, on $30,000 issue water bonds.

Marshall, Tex.—Voted $30,000 bonds for water works extension.

Pittsburg, Pa.—Will vote, July 12, on filtration plant.

Spokane, Wash.—Considering water meters.

Springfield, Tenn.—Will construct water works.

Syracuse, N. Y.—Sold $272,000 water bonds.

Toledo, O.—Mayor Jones recommends $500,000 water bond issue for purification plant.

Williamsburg, La.—Will add to water system.

CONTRACTS AWARDED.

Elmdale, Kan.—Contract for erection of municipal water works reported let to Scott Hood.

(East) Ottawa, Ont.—Contract for water works let to Murphy & Lowry, Ottawa, at $38,000.

St. Boniface, Man.—Contracts for water works were let as follows: Laying mains, O. L. Henaults, at $19,018; lead pipe, stop cocks and pig lead, to Allair & Elean, at $3,988; building power house, to Mr. Senecal, at $13,535.

Standpoint, Ida.—Contract for water systems let to J. A. Clark, Spokane, Wash.

Seaside, Ore.—Contract for water works let to J. Russell, Tacoma, at $7,150.

Toronto, Ont.—Contract for 6,000 feet of 72-inch steel pipe for under the bay let to Canada Foundry Company at $86,880.

Chester, Pa.—Contract for sewer and water connections in Kerlin street let to John Hanna & Sons.

Gloucester, Pa.—Contract for 8-inch artesian well let to John B. Rulon at $3 per foot.

Gloucester City, N. J.—Contract for driving 8-inch artesian well let to John B. Rulon, Ivyland, Pa., at $3 per foot.

Hudson, N. Y.—Contract for water works let to Hurd, Sherman & Company, Syracuse, at about $300,000.

Lynchburg, Va.—Contract for water works let to Chauncey G. Williams, Brooklyn, N. Y., at $499,360.65.

Minneapolis, Minn.—The lowest bidder for machinery for pumping station No. 1 was Schulman & Garber, $2,210.

St. Louis, Mo.—Contracts for laying water mains let to: John F. McMahon, 42,000 feet, at $28,364; 40,000 feet to Prendergast Construction Company at $20,684.

Waukeegan, Ill.—Contract for laying water mains let to H. C. Patterson, City.

Lawton, Okla. Ter.—Contract for water works let to McQuatters Plumbing & Machine Company, Hillsboro, Tex.

Lewes, Del.—Contract for extending water system let to Wm. O. Russell at $3,211.

Seattle, Wash.—Contract for water main in Howe street let to Stewart & Goelz at $14,541.

Whitecastle, Pa.—Contract for steel water tower let to American Bridge Company, Chicago, Ill., at $2,800.

Corunna, Mich.—Elevated tank system water works contract reported let to M. Walker & Company, Fenton, Mich.

LIGHTING

Alpena, Mich.—Engineer for electric light system is J. H. Blomshield, Bay City, Mich.

Batesburg, S. C.—Voted bonds for electric light plant. The Mayor.

Eastern Rapids, Mich.—Will erect electric light plant. J. W. Shelton, Mayor.

Lockport, N. Y.—Will advertise for bids for the lighting of the city for three years with arc and gas lights. City Clerk.

Milwaukee, Wis.—Council Finance Committee voted to issue $150,000 electric light bonds.

Murphy, N. C.—Considering electric light plant.

Newberry, S. C.—May construct electric lighting plant. Mayor.

Newburg Heights, O.—Bids, July 12, for supplying village with material and labor for street lighting. H. H. Bohning, Clerk.

Norman, Ga.—Norman Institute will install electric light plant. Professor E. G. Hall, Principal.

Pen Yan, N. Y.—Will call for bids for machinery for municipal lighting plant. The Mayor.

Petersburg, Va.—Considering electric lighting plant. City Council.

Ridgeville, Ind.—Electric light plant wanted. C. E. Barrett.

St. Joseph, Mo.—Will vote in July on issue of electric light plant. Mayor.

Trenton, Ill.—Will enlarge the light plant. George E. Poos, Mayor.

Burlington, Vt.—Proposed to construct $59,000 electric light plant.

Carrollton, Ga.—To issue electric light plant bonds. The Mayor.

Clarksville, Ga.—Considering lighting system. Mayor J. H. Hicks. Hicks.

Clinton, N. Y.—May install electric lighting plant.

Covington, Ky.—Supreme Court gives city right to erect municipal lighting plant.

Fort Mill, S. C.—Preparing plans for electric light plant.

Harrisonburg, Va.—To erect $70,000 municipal electric light plant.

Hilbert, Wis.—Plans prepared for $9,000 municipal gas plant.

Hoboken, N. J.—To readvertise for bids for lighting city with arc, gas, hydro-carbon or other lights.

Holyoke, Mass.—Gas works need new gas holder. W. H. Snow.

Janesville, Minn.—To issue electric light plant bonds.

Lockport, N. Y.—Mayor vetoed lighting contract as contrary to plan for municipal plant.

Luverne, Ala.—Will construct electric lighting plant. H. T. Brooke.

Oxford, Miss.—Considering electric light improvements. Mayor.

Portmouth, Va.—Alderman Erinson advocates municipal lighting plant.

Vail, Ia.—May install municipal gas plant.

Wilton Junction, La.—Said to have voted $5,000 electric light improvement bonds.

Zanesville, O.—Bids soon for lighting city. Considering Welsbach burners for suburbs. I. R. McCadden, Clerk of Council.

Akron, O.—Will probably buy 300 gas and gasoline street lights. Council Finance Committee.

Albany, Ga.—Of $10,000 bonds voted, part will go for electric light improvements.

Batesburg, S. C.—Voted electric light plant bonds.

Battle Creek, Ia.—Will vote soon on gas plant bond issue.

Benoit, Miss.—Considering an electric light plant. Mayor.

Royalton, Minn.—Considering municipal lighting system.

Browerville, Minn.—May install gas plant.

Chicago, Ill.—May issue $200,000 bonds for electric light extension.

Covington, Ky.—$75,000 is available for municipal electric light plant. Geo. F. Beach, Mayor.

Cumberland, R. I.—(Township.) $8,000 appropriated for street lights. Peter J. Gaskin.

Decatur, Ind.—Will add a 300-horse-power Corliss engine to city lighting plant.

Kalamazoo, Mich.—Considering $18,000 bond issue for electric plant improvements.

Lake City, Minn.—Will reconstruct electric light plant.

Lake Providence, La.—Will issue light plant bonds. The Mayor.

Lincoln, Neb.—Have sold $65,000 electric light bonds.

Marshall, Mich.—May reconstruct electric light plant. P. S. Joy, Supt.

Mount Olive, S. C.—Plans preparing for electric light plant.

Nashville, Ark.—Bonds voted for municipal electric light plant.

Newburg Heights, O.—Bids, July 12, for lighting streets. H. H. Bohning, Clerk.

Newberry, S. C.—May improve electric plant.

Norton, Kan.—May construct a light and power plant. P. Hinsdel, Mayor.

Norwood, O.—Bids, July 11, for $6,000 electric light bonds. W. E. Wichgar, City Auditor, at office of J. A. Stewart, 813 Traction Bldg. Cincinnati, O.

Ocilla, Ga.—Will erect municipal electric light plant. Mayor.

Pen Yann, N. Y.—May let contract for municipal electric light plant. Village Board Trustees.

Springfield, Tenn.—Will soon contract for electric light plant. City Councilman Bell.

Tarentum, Pa.—Voted $37,000 bonds for improvement of lighting plant.

Trenton, Ill.—Will enlarge electric light plant. Geo. F. Poos, Mayor.

Vassar, Mich.—Wants new engine for light and power plant.

West Bay City, Mich.—Will buy 1,000 pounds of copper wire. Comptroller.

West Mansfield, O.—Has sold $11,000 electric light bonds.

Whitehall, Mich.—Voted on electric light improvements.

Proposals for Street Lighting

SEALED proposals for lighting the streets of the City of Plattsburgh for a term of five years from November sixth next, will be received by the Board of Public Works of said city, at the office of said Board in said city, on Friday, July 15, 1904, at 10 o'clock A. M.

Such bids may be for a service of not less than eighty electric arc lights of 2,000 candle-power each, or for a service of not less than sixty electric arc lights of 2,000 candle-power each, or its equivalent if other lights are proposed, and not less than twenty-five electric incandescent lights of 32 candle-power, or its equivalent if other lights are proposed. Each bid shall state in detail the kind of light proposed to be furnished, its construction, erection and power.

Each bid shall give the price to be charged for lights to be kept lighted until one o'clock A. M., and the price for lights to be kept lighted from half an hour after sunset until half an hour before sunrise, and the Board reserves the right to designate the number and location of the all night lights and of those to be kept lighted until one o'clock A. M.

The Board reserves the right to reject any and all bids received, and to accept such bid as in the judgment of the Board and with the approval of the Common Council, is deemed for the best interest of the city.

Dated June 17, 1904.

W. J. McCAFFREY, Mayor.
G. F. TUTTLE,
JOHN HAUGHRAN,
M. A. SMITH,
Board of Public Works of the City of Plattsburgh.

CONTRACTS AWARDED.

Binghamton, N. Y.—Contract for lighting city streets let to Sun Vapor Company.

Bay City, Mich.—Bid of 13½ cents per pound for 8½ miles of 4.0 wire from Thorne Electric Company accepted.

Jacksonville, Fla.—Contract for turbine generator let to General Electric Company. Lowest bidder for condensing appliance for electric light plant was the Alburger Condenser Company at $3,345, and $265 additional for a different style.

Brooklyn, N. Y.—Contract for electric fixtures for Public Schools 13, 33, 40 and 59 let to Commercial Construction Company, New York, at $12,841.

PUBLIC BUILDINGS

Albany, N. Y.—Will build public bath house. Appropriation, $30,000. Charles M. Bissell, Comr. Pub. Works.

Atlanta, Ga.—Plans accepted for $32,000 school. Bd. of Education.

Baton Rouge, La.—$350,000 additional may be asked for State public schools.

Camden, N. J.—Revised plans approved for public library.

Copley Township, Summit Co., O.—Board of Education will sell $10,000 school bonds. H. C. Long, Clerk.

Duluth, Minn.—Considering a court house for St. Louis County.

Frankfort, Ky.—Plans submitted for new capitol. State Capitol Committee.

Galesburg, Ill.—J. Grant Beadle, architect, preparing plans for $100,000 school house.

Gambier, O.—Plans being prepared for $40,000 school building.

Greenville, Tex.—Will vote on $15,000 school bonds. The Mayor.

Keyser, W. Va.—Voted on $20,000 bonds for school. The Mayor.

New Orleans, La.—Bids for McDonogh school and city hall annex rejected. The Mayor.

Niagara Falls, N. Y.—Site for $130,000 Federal building secured.

North Bergen, N. J.—To build addition to Adelina Place school.

Ottawa, Ill.—Plans made for $65,000 school building.

Philadelphia, Pa.—Councils school committee recommends $80,000 and $15,000, respectively, for new schools.

Pittsburg, Pa.—Plans for $250,000 extension to Allegheny Co. jail.

Richland, Center, Wis.—Will erect $35,000 jail.

Rosell, N. J.—Bids soon for two-story brick school. Board of Education.

Salisbury, Md.—May construct $20,000 school house.

Santa Rosa, Cal.—State has purchased $45,000 school bonds.

Terryville, Conn.—Plans prepared for $25,000 school.

Trenton, N. J.—Plans under way for $40,000 brick school.

West Hoboken, N. J.—Will spend $150,000 for public schools.

Watertown, N. Y.—Reported Congressional appropriation of: $68,000 for improvement of Madison Barracks; $28,000 for new stables; $40,000 for gymnasium. The Hon. Chas. M. Knapp, M. C.

Albion, N. Y.—Will vote July 11 on issue of $40,000 school bonds.

Baton Rouge, La.—Bond issue for schools of $100,000 favorably reported on. The Hon. T. Rush Wimberly.

Camden, N. J.—Will issue $125,000 bonds for school buildings. Samuel P. Jones, President City Council.

Denton, Md.—Plans under way for $12,000 jail. Caroline Co. Comrs.

Duluth, Minn.—Will vote July 16 on $125,000 bond issue for schools.

Hyattsville, Md.—Will erect a new school building. Cost about $10,000. Chas. H. Welsh.

Jackson, Miss.—Considering new school building.

Kansas City, Mo.—Sold $225,000 bonds for improving city hospital. Unsold bonds include $250,000 for city market.

New Orleans, La.—Sixth district wants new school building. The Mayor.

Orange, N. J.—May erect $75,000 school building. Common Council.

Providence, R. I.—Ordinance passed for $90,000 school building.

St. Bernard, O.—Bids, July 14, for adding to town hall. George Meyer, Clerk.

Toledo, O.—Steps taken in behalf of new $250,000 city hall. Board of Public Service.

Two Harbors, Minn.—Architect Jas. A. MacLoud, St. Paul, preparing plan for $50,000 court house for Lake County.

West Bay City, Mich.—Will vote July 11 on issue of $30,000 school bonds.

Ackerman, Miss.—May erect $12,000 school building. Mayor.

Albany, N. Y.—Considering new school. Comr. Buel C. Andrews.

Arcola, Man., Can.—$12,000 voted for school building.

Atlanta, Ga.—New school to be erected.

Atlantic City, N. J.—Will issue $90,000 bonds for proposed school.

Baton Rouge, La.—Legislature will sanction bond issue of $750,000 for the court house at New Orleans.

Belmore, O.—To issue $8,000 bonds for new school.

Boonville, Miss.—Sold $40,000 court house bonds. Contract for erection to be let in July.

Cumberland, R. I.—$23,000 for public schools. Peter J. Gaskin.

Greenville, Miss.—Voted $30,000 bonds for school building.

Jersey City, N. J.—Bids wanted for $350,000 high school. Board of Finance.

Missoula, Mont.—$45,000 school bonds sold. School Board.

Pensacola, Fla.—Will erect school building.

Rochester, N. Y.—Four police station sites selected.

Tacoma, Wash.—May erect high school.

Vaiden, Miss.—Plans for new county court house; estimated cost, $40,000; Memphis, Tenn.—Board of Supervisors.

CONTRACTS AWARDED.

Anniston, Ala.—Lowest bidder for post office building was the Athens Construction Company, Athens, Ga., at $98,338.

Deadwood, S. D.—William H. Maxwell, Marquette, Mich., was lowest bidder for public building, at $161,889.

Des Ark, Ark.—Contract for prairie County court house let to F. H. Stewart, Newport, Ark.

Hopkinsville, Ky.—Contract for Christian County jail let to the Pauly Jail & Building Company, St. Louis, Mo., at $18,497.50.

Montgomery, Ala.—Contract for brick for the West End school let to R. Haggar & Brother.

Murphysboro, Tenn.—Contract for school let to W. C. Henry & J. E. Thompson.

San Antonio, Tex.—Contract for school building let to R. O. Langworthy at $9,830.

Worcester, Mass.—Contract for new city stables awarded to Edward J. Cross at $27,500.

Bridgeport, Conn.—Contracts for remodeling city hall let: Steel work to Lewis F. Shoemaker & Company, Philadelphia, at $10,294; masonry, A. D. Canfield, at $35,780; carpenter work, W. S. Hurlbure Building Company, at $13,000; copper work to John Schwing Corporation, at $6,989; roofing, James E. Kelly, $655; electric wiring, United Illuminating Company, at $955.

De Vall Bluff, Ark.—Contract for new court house let to F. H. Stewart, Newport, at $29,375.

Dysart, Ia.—Contract for new school building let to R. S. Williamson, Vinton, at $13,269.

Harrisburg, Pa.—Contract for finishing and decorating new capitol let to John H. Sanderson, Philadelphia.

Manchester, N. H.—Contract for Hillsborough County court house let to J. H. Mendell & Company, city.

Pensacola, Fla.—Contract for buildings, etc., at Fort Barrancas, awarded to H. Monk.

Sioux City, Ia.—Contract for the Hunt school building will probably be awarded to John Wall at $23,668.

Washington, D. C.—Contract for addition to Federal building at St. Joseph, Mo., let to W. J. McAlpine, Dixon, Ill., at $181,904.

Gloversville, N. Y.—Contract for armory let to Hudson Valley Construction Company, Troy, at $49,730; heating to R. T. Ford, Rochester, at $2,863; wiring, electric wiring, etc., John P. Kelly, New York, at $3,252.

Sioux City, Ia.—Contract for Hunt school building let to John P. Wall at $28,540.85.

Oneonta, N. Y.—Contract for the armory let to Hudson Valley Construction Company, Troy, at $47,630; heating to R. T. Ford, Rochester, at $2,719; electric wiring, etc., to John P. Kelly, New York, at $3,252.

FIRE DEPARTMENT SUPPLIES

Alva, Okla.—Paid department ordinance passed.

Babylon, L. I.—May improve fire department.

Barrie, Ont.—Will extend fire hall. Will buy $1,500 fire hose. E. Donnell, City Clerk.

Binghamton, N. Y.—Fire station site purchased. The Mayor.

Cleveland, O.—Bids soon for building and rebuilding engine houses.

Concord, N. C.—May spend $7,000 for improving fire department. Alderman Miller.

Durant, Ind. Ter.—Will equip new fire station.

Eldridge, Ill. (Scott Co.)—May organize fire department. No protection.

Fond du Lac, Wis.—May buy fire truck.

Harrisburg, Pa.—May rebuild Washington chemical fire engine.

Hoboken, N. J.—Mayor Laukering considering fire boats.

Homer, Mich.—May buy steam fire engine.

Jackson, Tenn.—Two companies have canceled fire policies on account of lack of protection.

Kansas City, Mo.—Wants new fire house.

La Crosse, Wis.—Selecting sites for two fire engine houses. President Beckwith, Board Public Works.

Lake Charles, La.—Will erect two fire stations.

North Fond du Lac, Wis.—Will purchase new fire bell.

Passaic, N. J.—May purchase fire hose. City Council.

Pawtucket, R. I.—May construct fire house. Councilman Fifield.

Pelham, N. Y.—May install fire alarm telegraph system, purchase 50-foot truck, combination chemical hose wagon and Waterous gasoline engine.

Portland, O.—May buy 100 new fire hydrants.

Quincy, Fla.—$10,000 fire department incorporated. Oscar Allschal.

Richmond, Va.—Bids rejected for new fire house.

Ridgeville, Ind.—Town wants fire ladder wagon. E. E. Barrett, President Town Board.

Scranton, Pa.—Will issue bonds for police and fire-alarm telegraph station.

Story City, Ia.—Will erect a new hose house.

Utica, N. Y.—Site secured for West Utica fire engine station. Board Police and Fire Comrs.

Wilmington, N. C.—Will improve the fire tug Marion. Fire Comr. Moore.

York, Pa.—Whil buy fire hose.

Artesia, N. M.—Will organize volunteer fire department.

Auburn, Ia.—Will buy fire engine.

Belleville, N. J.—Voted $1,900 for fire department improvements.

Camden, N. J.—Will issue $25,000 bonds for fire fighting apparatus. Samuel P. Jones, President Council.

Cincinnati, O.—May issue $325,000 bonds for improvement of fire department.

Cleveland, O.—Chamber of Commerce recommends high-pressure pumps and mains.

Covington, Ky.—May spend $320,000 for fire department improvements.

East Orange, N. J.—Plans accepted for hose house.

Fort Scott, Kan.—Will erect fire station.

Fort Worth, Tex.—May purchase 2,000 feet fire hose.

Harrisburg, Pa.—Will erect new house for Baldwin Hose Company.

Kansas City, Mo.—Sold $100,000 fire bonds. Bids soon for fire house.

Madison, Wis.—Plans accepted for new central fire station.

Mendocino, Cal.—Will erect new hose house, buy wagon and 200 feet 2½-inch fire hose.

Norfolk, Va.—Considering new fire station.

Oklahoma City, O. T.—Plans under way for engine house.

Pawtucket, R. I.—$25,000 appropriated for fire station.

Portsmouth, Va.—May buy fire harness and hose. Fire Comr.

Quincy, Ill.—Will buy combination chemical engine and hose wagon. Chief Schlag.

San Francisco, Cal.—Chief D. T. Sullivan asks for fire boat and six fire stations.

Syracuse, N. Y.—Rejected bids for 25 two-way fire hydrants. Will advertise for bids for brick hose tower.

Tolono, Ill.—Will ask for bids for fire hose.

Troy, N. Y.—Will receive new bids for three supply wagons and two chemical hose wagons. Old bids rejected. Board Contract and Supply.

Vancouver, B. C.—Will buy $1,500 worth of fire hose.

Weehawken, N. J.—Will advertise for bids for new combination hook and ladder truck and hose wagon for Highwood Fire Company.

Wheatland, Cal.—Will issue bonds for fire apparatus. R. N. Murphy, City Clerk.

Woodhill, N. Y.—May buy hook and ladder truck and other apparatus.

Youngstown, O.—Bids soon for steam fire engine.

Butte, Mont.—Fire Chief Sanger will buy 25 fire caps at once.

Camden, N. J.—Will buy 1,300 feet fire hose and four sections chemical hose.

Decatur, Ill.—May buy 1,000 feet fire hose; 7 fire alarm boxes. May improve fire houses.

Grand Island, Neb.—Bids, July 6, for 500 feet 2⅜-inch No. 1 rubber hose, Nebraska coupling. Edward Hooper, City Clerk.

Grand Rapids, Mich.—Will build fire engine house.

(Continued on page 33.)

ENGINEERS, CONTRACTORS, Etc.

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Harrisburg, Pa.—May purchase 4,000 feet fire hose and supply wagon.

Mechanicsville, N. Y.—Bids, July, for 300 feet fire hose.

Norristown, Pa.—Will buy set of Eastman deluge nozzles. Saml. Crawford.

St. John, N. B., Can.—Bids requested for double 60-gallon tank and combination chemical engine.

CONTRACTS AWARDED.

Barberton, O.—Contract for combination chemical engine and hose wagon, let to Seagrave Chemical Company, Cleveland, O.

Reading, Pa.—Contract for combination engine probably let to La France Engine Company at $2,190.

Washington, D. C.—Contract for combination chemical engine and hose wagon and 55-foot ladder truck let to American La France Engine Company at $1,800 for combination and $2,275 for truck.

SEWERS

Akron, Ohio—Will sewer Turner avenue. $10,000 required to restore sewer and pavement on North street.

Albany, N. Y.—Will sewer Madison avenue. Clerk Common Council

Atlanta, Ga.—Will construct sewers in eight streets. W. J. Campbell, City Clerk.

Bayonne, N. J.—Will build sewer in Hudson Boulevard. W. C. Hamilton, City Clerk.

Binghamton, N. Y.—$3,726 will be appropriated for sewers this year.

Butte, Mont.—Will lay district sanitary sewer in Watson avenue. P. H. Sidley, City Clerk.

Camden, N. J.—Will construct sewers and drains. H. C. Kramer, City Clerk.

Canton, O.—Will construct a main sewer in District 2.

Cincinnati, O.—Will sewer Academy avenue. City Clerk.

Erie, Pa.—Will sewer three streets.

Franklin, N. H.—May extend Bow street sewer.

Hartford, Conn.—Will construct a sewer. Henry F. Smith, City Clerk.

Newark, N. J.—Will probably sewer seven streets. C. C. Mundy, Supt. Pub. Works.

Portage La Prairie, Kan.—Plans under way for sewer system.

Portland, Ore.—Brooklyn wants a sewer. City Engr. Portland.

Reading, Pa.—Will sewer Washington street.

Rochester, N. Y.—Will sewer Weicher street.

Sacramento, Cal.—Will sewer an alley. Elbert Elkins, President Board Trustees.

South Hadley Falls, Mass.—Sewer proposed. Board Selectmen.

Sunnyside, Prince Edward Island, Can.—Collecting data as to sewer system. The Mayor.

Syracuse, N. Y.—Will construct 12-inch sewer in several streets. City Clerk.

Tacoma, Wash.—Will construct sanitary sewers. City Clerk.

Terre Haute, Ind.—$12,000 appropriated for sewers.

Toronto, Ont.—Bids wanted for brick and stone sewers. Mayor Urquhart.

Troy, N. Y.—May sewer Eighth street.

Town of Union, N. J.—Will sewer Cottage place. Emil Groth, Chmn. Board of Council.

Akron, O.—Considering sale of bonds for sewer repairs.

Bay City, Mich.—Will construct two sewers.

Birmingham, Ala.—Bids soon for village creek sewer, Jefferson County.

Chicago, Ill.—Will construct $1,000,000 sewer. Plans ratified.

Cortland, N. Y.—Will improve sewer system.

Covington, Ky.—Will construct stoneware and other sewers.

Edgewater (Borough), N. J.—Will install sewer system. Borough Engr. Cass.

Erie, Pa.—Will sewer five streets. Alderman Veit.

Grand Rapids, Mich.—Estimates made for sewers in five streets.

Kansas City, Mo.—Bids wanted for building manholes and catch basins.

La Crosse, Wis.—Plans for sewer completed. Sewer Com.

Lambertville, N. J.—Plans under way for sewerage system.

(Continued on page 34.)

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Lawrence, Mass.—May construct sewer.

Manchester, N. H.—Considering sewers.

Minneapolis, Minn.—Resolution passed for sewers. J. C. Haynes, Mayor.

Naugatuck, Conn.—Plans under way for sewer.

New Britain, Conn.—Will sewer several streets.

New Orleans, La.—Bids, July 7, for 6,000 feet drainage channels, concrete, vitrified pipe, etc. F. S. Shields, Secretary Sewerage and Water Board, 602 Carondelet street.

Oakland, Cal.—Will sewer several streets. Frank R. Thompson, City Clerk.

Peabody, Mass.—Voted $150,000 bonds for sewer system.

Portland, Me.—Will sewer several streets.

Albany, N. Y.—Will probably sewer two streets.

Augusta, Ga.—Will sewer several streets.

Beloit, Wis.—May spend $25,000 in sewers.

Bridgeport, Conn.—Will sewer three streets. E. T. Buckinham, City Clerk.

Camden, N. J.—Will sewer several streets. L. Mohrman, Street Comr.

Carrollton, Ga.—Voted sewer bonds.

Cincinnati, O.—Bids, July 7, for sewering Strada avenue. Geo. F. Holmes, Clerk.

Dallas, Tex.—Proposes to construct sewers.

Darlington, S. C.—Surveys being made for sewerage system. Mayor.

Hope, Ark.—Sewer system, near future.

Louisville, Ky.—Will vote soon on bond issue $3,500,000 for streets and sewers.

Marshall, Tex.—Voted $45,000 sewerage system bonds.

Oakland, Cal.—Plans accepted for sewering several streets.

Rushville, Ind.—May construct sewers.

Sacramento, Cal.—Bids will be asked for sewers.

Saginaw, Mich.—Will sewer several streets.

St. Paul, Minn.—Will probably construct extensive system. Alderman Moriarty.

Syracuse, N. Y.—Sold $272,000 sewer bonds. City Engineer.

Terre Haute, Ind.—May spend $12,000 in sewers. Board Public Works.

West Bay City, Mich.—Will sell $60,000 improvement bonds.

Winnepeg, Man.—Will sewer many streets.

Contracts Awarded.

Milwaukee, Wis.—Contracts awarded for sewer in Seventh avenue and Clarence street let to R. J. Hickey at $1.38 per lin. foot for 2,622 feet; for sewers in Fifth and Sixth avenues to George E. Zimmerman; for sewers in at $1.34 per lin. foot for 1,184 feet.

Montclair, N. J.—Contract for sewer in Highland avenue let to Donato Fusco.

Bay City, Mich.—Contract for a 10-inch sewer in Farragut street let to M. J. O'Brien at $258; for sewer in Portsmouth to R. Donohue & Company at $265; also sewer in Bradley's addition at $255.

Cincinnati, O.—Contract for Pearl street sewer let to Thos. P Strack at $8,365.

Harrisburg, Pa.—The following were the lowest bidders for sewers in the following streets: Curtis and Angle alley, to W. H. Opperman, $498; Washington and River streets, George E. Stucker, at $7.83; Cherry avenue, Bradley & Caldwell, $77; Cranberry and Court avenues, to W. H. Opperman, $1,085.

Naugatuck, Conn.—Contract for sewer in Bradley street let to Edward Tracy. Cherry street sewer bids were rejected.

Rockville, Conn.—Contract for Maiden lane sewer let to John Mulligan at 40 cents per foot.

Scio, O.—Contract for sanitary sewer let to F. A. Piero and A. R. Turnbull, Canton, O., at $20,000.

Syracuse, N. Y.—Contract for 24-inch pipe sewer in Cleveland, Craig and other streets let to Martin Lavelle at $6,509.09; for 10-inch sewer in Lodi street at $9,166; for 12-inch pipe sewer and 12-inch sewer in Grassman avenue, let to Philip Thomas, at $6,757.50 and $425.50, respectively.

(Continued on page 35.)

THE BEST MUNICIPAL BOOKS

Sewers and Sewage

SEWAGE AND BACTERIAL PURIFICATION OF SEWAGE. Methods of disposal, etc. Samuel Rideal, D.Sc. (English.) 278 pp. $3.50. Postage 13c. w.

SEWERAGE. Design, construction and maintenance of sewer systems. A. Prescott Folwell. 445 pp., illus. $3.00. Postage 17c. w.

SEWAGE DISPOSAL. Methods of disposal and purification. Wyncoop Kiersted. 182 pp. $1.25. w.

SEWER DESIGN. Treatise on sewer construction. H. N. Ogden. 234 pp., illus. $2.00. w.

SEWERS AND DRAINS FOR POPULOUS DISTRICTS. Rules and formulas for dimensions and construction. J. W. Adams. $2.50. v.

PURIFICATION OF SEWAGE. Scientific principles of sewage purification and their application. Sidney Barwise. (English.) Illus. $2.00. v.

CLEANING AND SEWERAGE OF CITIES. Translated from the German. R. Baumeister. Illus. $2.00. v.

SEWAGE WORKS ANALYSES. Methods of analysis used in laboratory of Manchester Sewage Works, England. Gilbert J. Fowler. 128 pp., illus. $2.00 net. Postage 6c. w.

PURIFICATION OF SEWAGE AND WATER. W. J. Dibdin. (English.) 3d Edition. Illus. 379 pp. $6.50. Postage 18c. v.

SEWAGE DISPOSAL IN THE UNITED STATES. G. W. Rafter and M. N. Baker. Illus. $6.00. v.

SEPARATE SYSTEM OF SEWERAGE. Theory and construction. Cady Staley and G. S. Pierson. Illus. $3.00. v.

SEWERAGE AND LAND DRAINAGE. Geo. E. Waring, Jr. Illus. $6.00. v.

MODERN METHODS OF SEWAGE DISPOSAL FOR TOWNS, PUBLIC INSTITUTIONS AND HOUSES. Geo. E. Waring, Jr. Illus., 260 pp. $2.00. v.

SEWERAGE AND SEWAGE PURIFICATION. M. N. Baker. 50 cents. v.

THE TREATMENT OF SEWAGE. Dr. C. Meynott Tidy. 50 cents. v.

ELEMENTS OF SANITARY ENGINEERING. Mansfield Merriman. 222 pp. $2.00. w.

Roads and Pavements.

HIGHWAY CONSTRUCTION. Treatise on construction and maintenance of roads, streets and pavements. A. T. Byrne. 895 pp., illus. $5.00. w.

TEXT-BOOK ON ROADS AND PAVEMENTS. Country roads and city streets. F. P. Spalding. 213 pp., illus. $2.00. w.

STREET PAVEMENTS AND PAVING MATERIALS. Methods and materials of city street construction. George W. Tillson. 496 pp., illus. $4.00. Postage 19c. w.

ROADS AND PAVEMENTS. Paving materials and pavement construction. Ira Osborn Baker. 600 pp. Illus. $5.00. Postage 21c. w.

CITY ROADS AND PAVEMENTS. William Pierson Judson. 186 pp., illus. $2.00. Postage 12c. e.

ROADS: THEIR CONSTRUCTION AND MAINTENANCE. Special reference to road materials. Allen Greenwell and J. V. Elsden. (English.) 280 pp., illus. $1.50. Postage 9c. wh.

ECONOMICS OF ROAD CONSTRUCTION. A short practical treatise. Herbert P. Gillette. 41 pp., illus. $1.00. e.

PRACTICAL TREATISE ON THE CONSTRUCTION OF ROADS, STREETS AND PAVEMENTS. Gen. Q. A. Gilmore. Illus. $2.00. v.

NEW ROADS AND ROAD LAWS IN THE UNITED STATES. Gen. Roy Stone. Illus. $1.00. v.

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See other lists elsewhere.

MISCELLANEOUS

Buffalo, N. Y.—Voted $60,000 bonds for grade crossing work.

Cincinnati, O.—Sold $500,000 bonds for park extension. W. T. Perkins, City Audr.

Columbus, O.—May vote $7,000 bonds for street signs.

Jersey City, N. J.—Hudson County Park bonds, $500,000, were sold at 106.335 per cent. Considering sites.

New Orleans, La.—Dock Board plans complete system of wharves with fireproof sheds, paving and water mains.

Racine, Wis.—Will make public park on Packard Island. Mayor Nelson.

Rutherford, N. J.—Will construct parks. Joseph Schenck.

Syracuse, N. Y.—Committee will investigate sewage disposal.

Waterbury, Conn.—Considering purchase of a $2,500 steam roller. Mayor Elton. Also considering sewage disposal plant.

Boston, Mass.—$40,000 voted for bath houses.

Camden, N. J.—Will issue $90,000 Park bonds. Saml. P. Jones, President Council.

Kansas City, Mo.—Sold $200,000 park bonds. Considering clean streets.

Lawrence, Mass.—May purchase portable stone crusher. Com. on Streets.

Portland, Me.—Electric company may place wires underground.

Reading, Pa.—Bids for sewage disposal plant rejected. Hawman Bros., city, bid $148,930; Standard Sanitation Company, New York, bid $170,767.

Rochester, N. Y.—Bids soon for new ballot machine. Clerk Bd. Contract and Supply.

Saginaw, Mich.—Will buy a sprinkler wagon.

Toledo, O.—Proposition to furnish 5,000 street signs for $1,500 referred to Committee on Public Improvement.

Allegheny, Pa.—Mayor will make two-year contract for garbage disposal.

Chicago, Ill.—Finance Committee recommends bond issue of $75,000 for bath houses.

Cumberland, R. I. (Township.)—$2,700 appropriated for drinking fountains and hydrants. Peter J. Gaskin.

Galesburg, Ill.—May erect garbage disposal plant.

Jacksonville, Fla.—Bids, July 16, for improving Withlacoochee river, Fla., by Capt. F. R. Shunk, Corps Engrs., U. S. A.

Jewett City, Conn.—Arrangements will be made for garbage disposal.

Newark, O.—Plans being prepared for sewage purification works by Walter P. Rice Engineering Company, Cleveland, O.

Parkersburg, Ia.—Proposes to construct sewage disposal plant. W. Evans, City Clerk.

Pittsfield, Mass.—Bids will be received by Board of Health for 5-year garbage contract. Not to exceed $16,500.

Reading, Pa.—Loan bill, for enlargement sewage disposal plant, signed by Mayor.

Saugerties, N. Y.—Bids, July 7th, for sewage disposal works. Board Sewer Commissioners.

Schenectady, N. Y.—May ask for bids soon for garbage system.

Springfield, Ill.—Will sell, July, $50,000 Park bonds. Geo. N. Black, President.

Urbana, Ill.—Will install a $4,000 septic tank.

Wheeling, W. Va.—Dr. A. R. Warden, State Board of Health, advocates garbage crematory. Bids, July 11th, for constructing guide cribs at docks 2, 3 and 11, Kanawha river, W. Va. U. S. Engr. Office, Wheeling.

Contracts Awarded

Bridgeport, Conn.—Contract for 10 years' disposal of garbage, let to G. E. Winton, at 50 cents per ton.

New Orleans, La.—Contract for St. Joseph street wharf, let to Cook and Laurie Contracting Company at $3,689.

Wilmington, N. C.—Contract for Portland cement let to Hydraulic White Brick Company at $1.80 per barrel.

Charleston, S. C.—Contract for cement and bricks let to Carolina Portland Cement Co., at 42 cents per hundred pounds for Portland cement; Rosendale cement, 35 cents per 100 lbs. Gagers' white lime. 40 cents per 100 lbs. Select hard bricks, $7.25 per 1,000. Run of hard bricks at $6.25 per 1,000.

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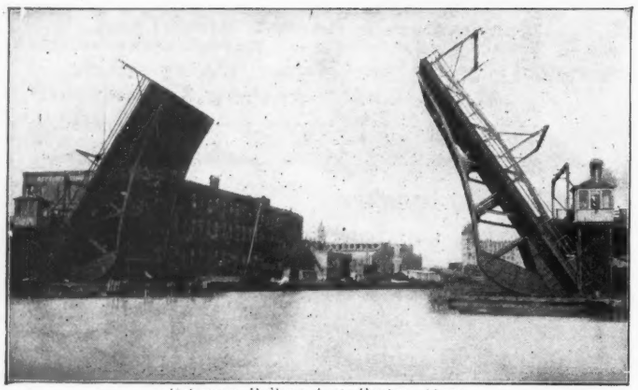

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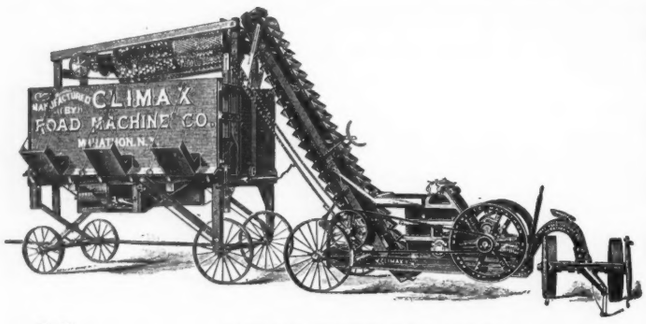

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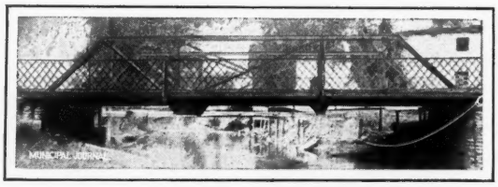

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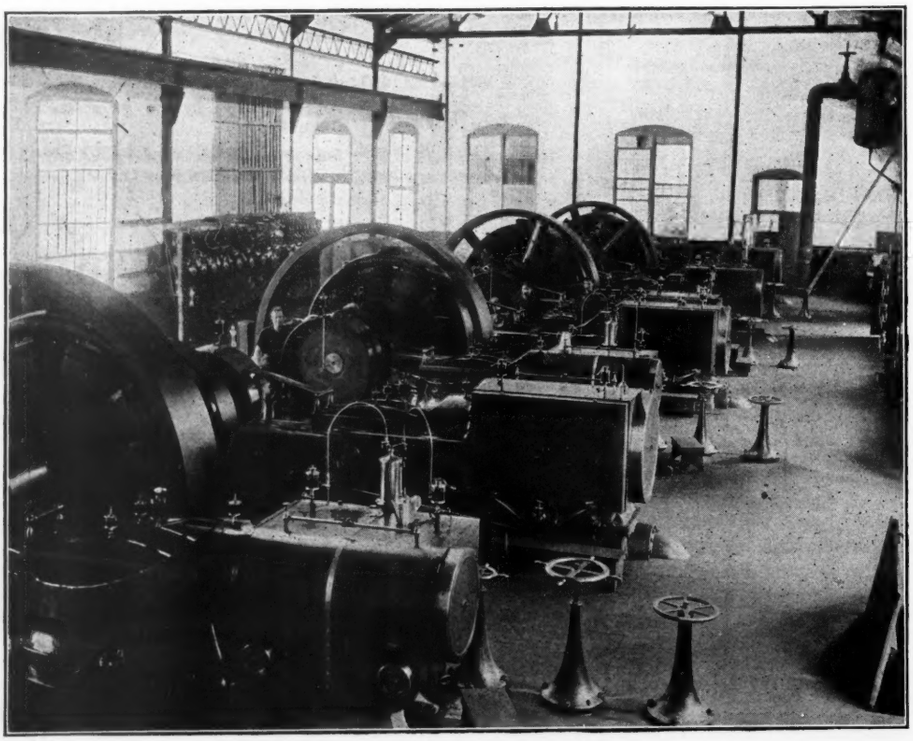

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